BAADER DOMES

60 YEARS OF EXPERIENCE

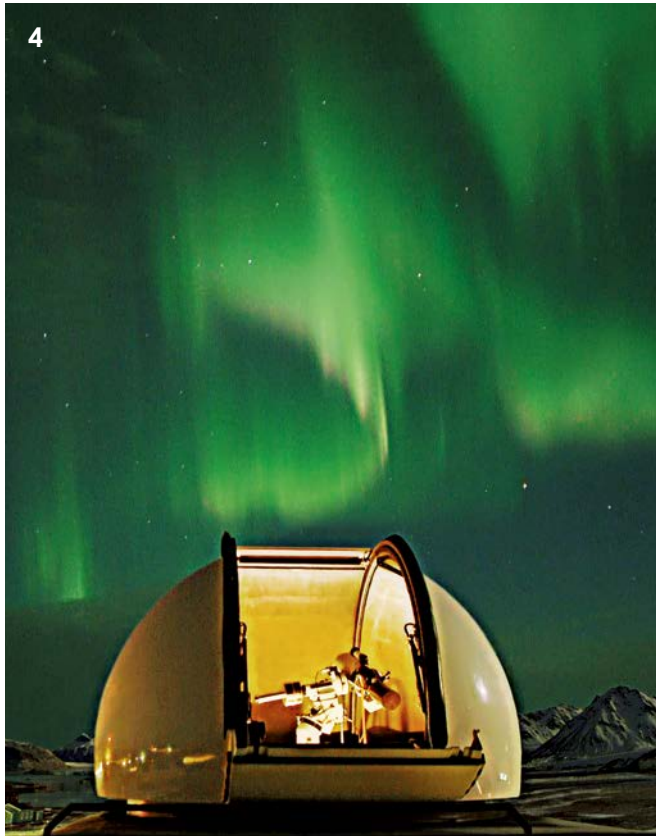


baader.space











1. 3.2 m Slit Dome for Meteoswiss, Mt. Jungfraujoch / Switzerland
2. 8.5 m Slit Dome for LMU University, Mt. Wendelstein / Germany
3. 4.5 m AllSky + 5.3 m & 2x 6.15 m Slit Dome for University of Bern, Switzerland
4. 3.2 m Slit Dome for AWI, Svalbard
5. 8.5 m Slit Dome for FORTH, Mt. Skinakas / Greece



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Installation of 8,5 m Slit Dome on Mt. Wendelstein, Germany

REFERENCES

SLR / SSA / LASERCOM

NASA | ESA – European Space Agency | Airbus Defence and Space | DLR – German Aerospace Center | cailabs – Innovative Solutions for Optical Communication | MPE – Max Planck Institute for Extraterrestrial Physics | RIKEN Center for Advanced Photonics (RAP) | DIGOS – Laser Ranging for Satellites | Bundeswehr – German Armed Forces | arianespace – Launch Services for Satellites | GFZ – Helmholtz Centre Potsdam | KIT-Campus Alpine: Atmospheric Environmental Research | BKG – Federal Agency for Cartography and Geodesy | SSC – Swedish Space Corporation | NLS – Finnish Geospatial Research Institute FGI

SCIENCE & RESEARCH

The Open University | DWD – German Weather Service | AWI – Alfred Wegener Institute | MPA – Max Planck Institute for Astronomy | MPP – Max Planck Institute for Physics | MPI – Max Planck Institute for Informatics | ZEISS | AIP – Leibniz Institute for Astrophysics Potsdam | FORTH – Foundation for Research and Technology Hellas | ESO – European Southern Observatory | Sharjah Center for Astronomy and Space Sciences | KIS – Kiepenheuer Institute for Solar Physics | Solaris – Nicolaus Copernicus Astronomical Center | Institute for Astrophysics Göttingen | MeteoSwiss – Federal Office of Meteorology and Climatology

EDUCATION









































University of Bern | LMU – Ludwig Maximilian University of Munich | University of Kent | EGN – Einstein Gymnasium Neuenhagen | IAC – Institute of Astrophysics of the Canary Islands | Eberhard Karls University of Tübingen | Arnoldischule Gotha – State Gymnasium | Kepler Gymnasium | vhsrt – Reutlingen Adult Education Center | University of Hamburg | phaenovum – Gersbach Observatory | JSG – Rheinische Friedrich Wilhelms University Bonn | Leonardo Da Vinci Campus | University of Barcelona | LGL – Lessing Gymnasium Lampertheim | Gymnasium Penzberg | Kopernikusschule Freigericht | SGM – Staffelsee Gymnasium Murnau | Gymnasium Balingen | Hamar Cathedral School

PUBLIC





















experimenta – The Science Center | Haus der Natur – VEGA Observatory | ATHOS – Centro Astronomico Isla de la Palma Canarias | Welzheim Observatory | Zollern-Alb Observatory | Lübeck Observatory | Munich Public Observatory | SWRT – Reutlingen Observatory | TLS – Thuringian State Observatory | Drebach Observatory

INTRODUCTION

WHY BAADER PLANETARIUM DOMES

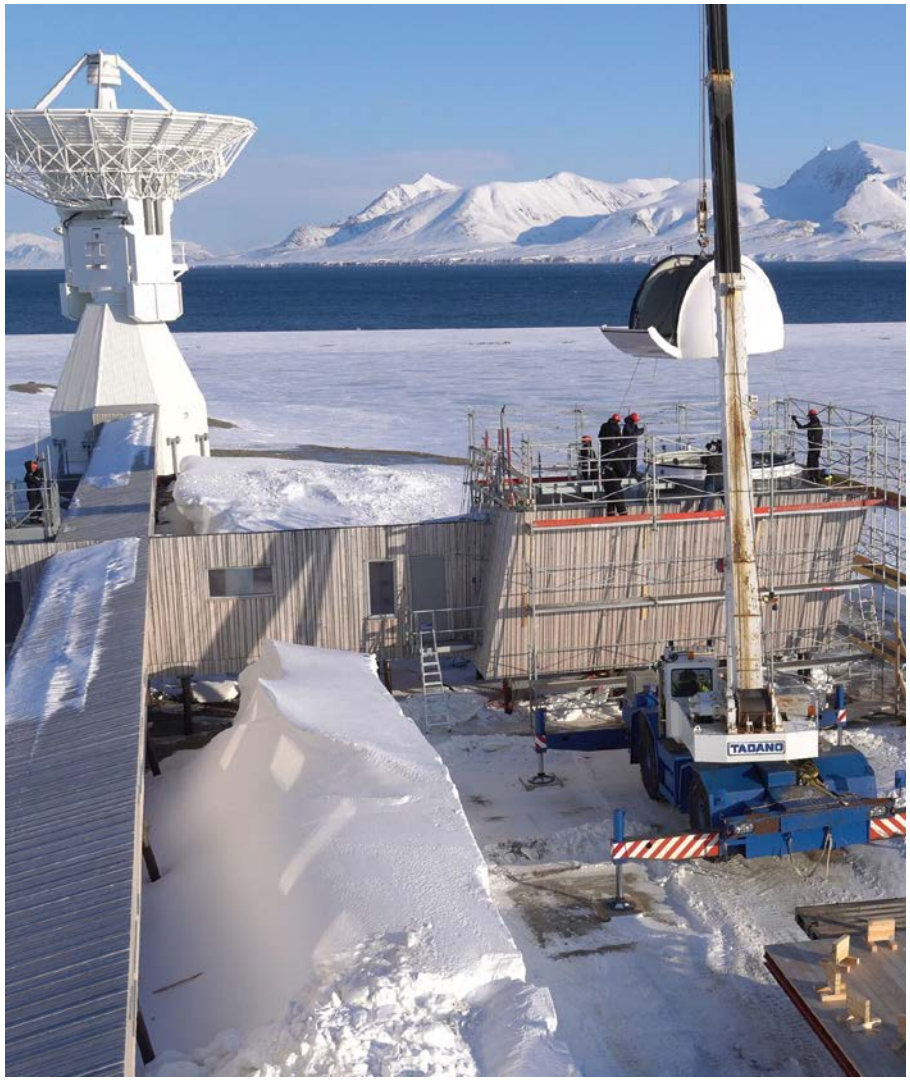
Baader Planetarium is a middle sized enterprise having over 50 years experience producing and installing astronomical equipment and turn-key observatory solutions.

The key capability is the production of high-end domes.

More than 600 observatory domes of sizes from 2.1 m up to 8.5 m have been installed, together with a large number of projection domes for planetariums that are up to 10m in diameter. Observatory domes can be utilized for multiple applications around the world and we also specialize in solutions that work in harsh environments. Some of which can be found in Antarctica (Dome C -84°C), high Arctic regions such as Svalbard (NyÅlesund -45°C), Ellesmere Island (Eureka -60°C), in desert conditions with hermetic seals against dust, and a number of high mountain locations.

Our customers are institutions, universities, observatories and companies around the world, amongst them:

- NASA (National Aeronautics and Space Administration)
- AWI (Alfred Wegener Institute for polar research)
- MPI (Max Planck Institution)
- University of Hamburg (PIST-Project Mallorca)
- Open University UK (PIRATECOAST Project Tenerife)
- ESO (European Souther Observatory)
- NLS (Finnish Geospacial Reserarch Institute)
- FORTH Skinakas Observatory Crete
- LMU (Ludwig Maximilian University Munich): Mt. Wendelstein Observatory
- SCASS (Sharjah Center for Astronomy & Space Sciences)
- IAC (Canary Islands)
- RAP (RIKEN Center for Advanced Photonics)
- DLR (Deutsches Zentrum für Luft- und Raumfahrt e.V.)
- AIRBUS Group



Installation of 4.2 m Highspeed Slit Dome for NASA in NyAlesund, Svalbard

BAADER PLANETARIUM

ABOUT US

Baader Planetarium provides the tools to teach and enable people to explore the universe we live in.

OUR VALUE PROPOSITION

- We offer the most reliable **Domes** in the market which survive the harshest environmental conditions.
- We provide **Turn-Key Observatory Solutions** by integrating observatory equipment to function as a system utilizing in-house developed and customized products and software.
- Customers can rely on fast shipment of requested **Astronomical Consumer Products** along with support.

HISTORY

Our company started in 1966 with the first product being the Baader Planetarium which also became our name. Since then, we continued to expand by offering domes that would protect telescopes for astronomers in different environments around the world. We also realized the need of further educating and providing the right equipment for our customers needs, hence, we developed a variety of accessories to adapt all the components required to install complete observatories.

The observatory domes we produce and the high end telescopes and mounts from the brands we sell are also in demand from the space industry. We combine these devices to fully integrated turn-key ground stations for satellite tracking, laser communication and space debris tracking and install them everywhere in the world.







>600
OBSERVATORIES

60+
YEARS EXPERIENCE

3.560m
TALLEST MOUNTAIN

300 km/h
HIGHEST WIND LOAD

-86°C
COLDEST TEMPERATURE

BAADER PLANETARIUM

DOME PRODUCTION

At Baader Planetarium GmbH, all dome production operation is carried out at the company location in Mammendorf, Germany. Several buildings are housing all design and construction divisions required to manufacture all components of our highly sophisticated domes in various sizes and versions. Our range includes classic remote controllable automatic slit domes for science and education, alongside highly dynamic advanced domes featuring ultra-fast rotation and opening / closing times. These domes are designed with increased structural stiffness and extremely rigid mechanics, aimed at working 24/7 for decades without requiring regular maintenance. We also offer a full series of non-rotating AllSky domes, which again supply ultra-reliable mechanical and electronic build-quality, designed for decades of service with minimal to no maintenance.

All steel and GRP parts of all domes are entirely produced on-site, allowing all domes to work and be controlled remotely. A team of design engineers, software developers and electrical engineers works closely in unison with a multitude of skilled steel and GRP-workers, to tightly control production and to fabricate all sizes of Baader domes.

Each dome is fully assembled in our building and testing area, undergoing a series of performance tests before being disassembled and prepared for truck or container shipment into all remote corners of the world.

> *"Utmost reliability is our business model – for more than 60 years"*
>
> Thomas Baader, CEO







1. Baader Planetarium AllSky & Slit Dome Production
2. Mounting area for dome assembly and factory acceptance
3. Fiberglass part production area with activated carbon air purification

BAADER PLANETARIUM

CNC PRODUCTION

At Baader Planetarium GmbH, our CNC production line is a cornerstone in the manufacturing of high-precision components essential for state-of-the-art observatories.

PRECISION AND EFFICIENCY

Our production process integrates CAD/CAM software, ensuring high precision from the initial design to the final product. This allows us to efficiently transform raw materials into insulated, precise parts necessary for high-performance observatories. We select premium materials that withstand extreme conditions, from far sub-zero temperatures at high-altitude observatories to the heat and dust of desert environments. Our machining capabilities include:

- **Precision Milling:** For creating detailed components with high dimensional fidelity.
- **Turning Operations:** Essential for producing all moving gear and other components used in the mechanisms of our observatories.
- **Quality Control:** Rigorous testing and inspection at every stage ensures that each part meets our high standards of anti-obsolescence.

CUSTOM COMPONENT FABRICATION

We excel in creating bespoke components tailored to unique specifications in almost every observatory project. Whether it's crafting intricate mechanical parts for telescopes or robust housings for sensitive electronics, our CNC capabilities ensure that every piece meets strict quality standards. Our commitment to excellence supports astronomers worldwide in their quest to expand human knowledge of the cosmos.



MAZAK INTEGREX J-200S

Specialized Robotic aided 7Axis mill-turn machine for automated parts production with highest possible dimensional accuracy. Features dual spindles and extensive Y-axis capability for versatile machining.



MAZAK INTEGREX I-100S

High precision 7-axis lathe equipped with a barstock loader, the MAZAK I-100S excels in automated parts production, offering exceptional precision and efficiency for most complex tasks.



HERMLE C 250

5-axis simultaneous milling machine, the Herme C250 specializes in the precision production of large milled parts. Its robustness allows to work with a variety of materials, necessary for our demanding requirements.



ROMI C 420

Cycle lathe with tool chuck, the Romi C 420 is tailored for standard rotating parts. It offers consistent performance and reliability, ideal for routine and repetitive tasks.



ø 2.1 – 8.5 m

BAADER SLIT DOMES

AUTOMATIC SLIT DOMES

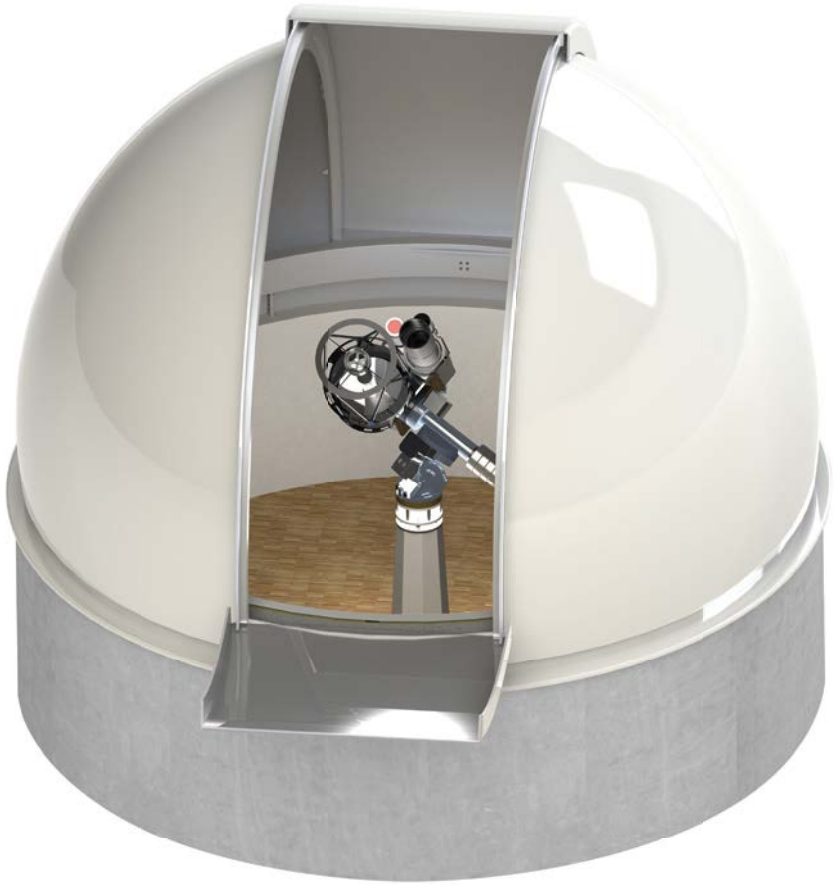
ADVANCED SLIT DOMES (HIGHSPEED)


baader
planetarium

INTRODUCTION

BAADER SLIT DOMES

Observatory domes with broad up- and over-shutter and that can be controlled remotely, sized from 2.1 to 8.5 meters in diameter. They can be in sync with your remote / robotic telescope setup, with endless rotation, horizontal flap movement, and are fully ASCOM and INDIGO compatible – or via dedicated API.



AUTOMATIC SLIT DOMES

Baader's Automatic Domes are typically used by private individuals and they are operated with a motorized sub-system controlled via a hand controller or remotely. These are typically used for smaller telescope setups up to a 600mm aperture.

Applications:

- Astronomy
- Astrophotography

Available sizes:

- 2.1m, 2.6m, 3.2m, 5.3m, 6.15m

ADVANCED SLIT DOMES (HIGHSPEED)

Advanced (Highspeed) Slit Domes are used by a variety of users and can fit medium to large telescope setups up to 2000 mm aperture.

Applications:

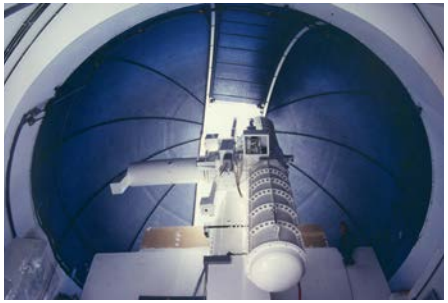
- Astronomy / Astrophotography
- Satellite Laser Ranging (SLR)
- Space Domain Awareness (SDA)
- Free-Space Optical Communication (FSOC)
- Defense

Available sizes:

- 3.2m, 4.2m, 5.3m, 6.15m, 8.5m



FORTH-Observatory, Crete – 5.3 m Dome



Gregory Telescope, Tenerife– 8.0 m Dome



University Neuenhagen, Germany – 3.2 m Dome



NASA, Greenbelt (USA) – 4.2m Highspeed Dome

ALL BAADER SLIT DOME MODELS INCLUDE:

Installation	Performed by Baader personnel at the customer site
Warranty	2 years warranty for mechanical, electronic and electric components
	10 years warranty for outer dome skin in accordance with IP54
	We warrant for 200km/h wind speed (Advanced: upgrade up to 300km/h available) to achieve undeteriorated performance and protection of the dome interior, with the dome being closed and in parking position
Fail-safe Features	Hand crank system to close dome in case of power failure
	Ready for Emergency Weather Station

LEGEND (all measurements in mm):

A	Dome outer diameter	**E**	Required concrete dome foundation
B	Outer zenital dome height above foundation	**F**	Unobstructed telescope moving radius from geometrical dome center [●])
C*	Lowest clear horizon (spring line)	**G**	Cylindrical base height
D	Clear slit aperture		

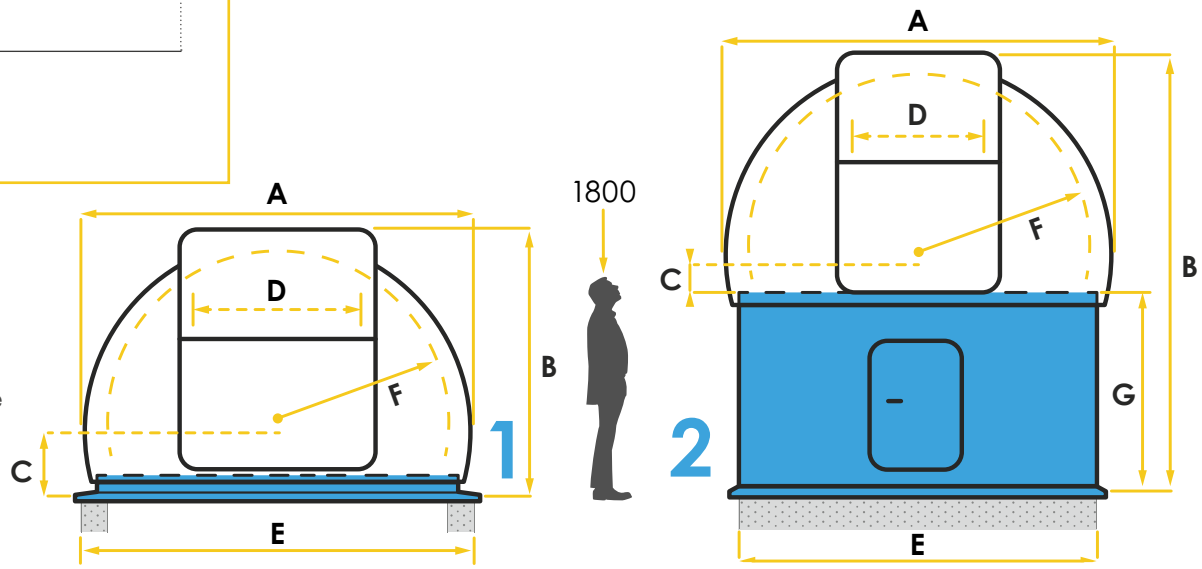
* **Attention:** Spring line height (**C**) varies according to selected advanced features.

MEASUREMENTS

REQUIRED FOR ALL BAADER SLIT DOMES:

Either short cylinder (1) OR cylindrical base (2)

The short cylinder is the interface between the dome and the structure is it to be installed on. The cylindrical base is another option that can be incorporated to maximize the interior of an observatory.





Deutsches Museum, Munich – 3.2 m Dome



Zollern-Alp, Germany – 2x 4.2 m + 6.15 m Dome



Private Observatory, Germany – 3.2 m Dome



ChazDuraz Observatory, Italy – 2.6 m Dome

SPECIFICATIONS

BAADER SLIT DOMES

FOR ALL VERSIONS AUTOMATIC ADVANCED



STRUCTURE / MATERIAL

Built as a self-contained structure made of Glass-fiber Reinforced Polyester (GRP) with dual slit arches mounted on a precision laser cut steel ring, an up and over shutter, and a horizontal flap.



ENDLESS DOME ROTATION

Supplied with a Continuous Power Bar (CPB) enabling endless dome rotation and permanent remote control of the shutter and horizontal flap.



ENVIRONMENTAL & VARMINT PROTECTION

Protecting your system is critical for the functionality and longevity of the housed equipment, hence, silicone seals are used to mitigate the entry of unwanted particles and varmint.



AUTOMATED DOME CONTROL

An electronical controller with an interface that enables the end-user to control the dome locally with a hand control unit and remotely via direct drivers, API, ASCOM or INDIGO.



INNER SURFACE

The inner surface of the dome is coated with a non-reflective paint to mitigate stray light from affecting data collection and avoid hotspots to form during daytime operation.



EMERGENCY WEATHER STATION

A component that is hardwired to the control sub-system which commands the dome to close in case of precipitation or high wind speeds – no readout.

SPECIFICATIONS FOR:

AUTOMATIC SLIT DOMES



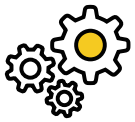
ROTATION RATES(S)

from 2° per second up to 8°/s



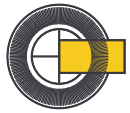
OPERATION-READY

Flap and shutter open & closing time(s) of 30s - 90s depending on dome size (see table on page 25)



AZIMUTHAL DRIVE CONCEPT

- One friction drive unit for 2.1m dome
- Two units for 2.6m – 4.2m domes
- Three units for 5.3m and 6.15m domes



ENCODERS

Azimuth encoder with homing sensor. To synchronize the dome position with the telescope



WIND SPEEDS

Survival: up to 200 km/h,
Operational: up to 60 km/h (7 bft max. gusts)



TEMPERATURE RANGE

Survival: -40°C to +60°C,
Operational: -20°C to +40°C

SPECIFICATIONS FOR:

ADVANCED SLIT DOMES (HIGHSPEED)



ROTATION RATES(S)

from 2° per second up to 30°/s (for 3,2m to 6,15m domes) and 2°/s up to 15°/s (for 8.5m dome)



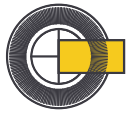
OPERATION-READY

Flap and shutter open & closing time(s) of 20s - 30s (8.5m: 180s) depending on dome size (see table on page 25)



AZIMUTHAL DRIVE CONCEPT

Three geared drive units, for continuos 24/7 maintenance-free operation



ENCODERS

Absolute Encoders in Azimuth and Shutter. Immediately when powering up the exact shutter and dome positions are recognized



WIND SPEEDS

Survival: up to 200 km/h (High-Alpine Upgrades up to 300 km/h available),
Operational: up to 60 km/h (7 bft max. gusts)



TEMPERATURE RANGE

Survival: -40°C to +60°C (Standard),
Operational: -20°C to +40°C (Standard)
(Climatic Performance Upgrades available)



EMERGENCY CLOSURE UPS

A fail-safe feature that is incorporated and only utilized for the dome to ensure self-closure in case there is a power failure.

BAADER SLIT DOMES

OPTIONAL UPGRADES

FOR ALL VERSIONS AUTOMATIC ADVANCED



PROFESSIONAL WEATHER STATION

If additional environmental situational awareness is desired for the observatory, a weather station that includes multiple sensors for weather data monitoring and logging.



PROVISIONS FOR LIFTING EQUIPMENT

Mechanical attachment points and/or integrated beams inside the dome for client supplied cranes or instrument lifting equipment.



DESERT UPGRADES

Enhanced dust-proof seals throughout, as well as sealed running gear, dual insolation, maximum IR-reflection of the outer shell and temperature hardened electronics are available for harsh environments demanding improved protection.



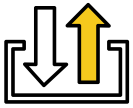
CUSTOM MODIFICATIONS

For customers that require mechanical modifications with flanges and holders for individual electromechanical equipment.



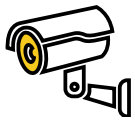
LED INTERIOR LIGHTING

Downward-radiating wall lights can be provided in alternating red and white light, separately controllable and dimmable.



INPUT / OUTPUT MODULE

Special module for the dome electronics, allows to communicate in a secure way with certain I/O ports of the Controller



LOCAL SITUATIONAL AWARENESS

Indoor and outdoor camera, to provide awareness of the status inside and around of your observatory (requires OMS, see page 46).



AIR DRYING SYSTEM

Depending on your site's location, an air dehumidifier is recommended to control moisture and dust levels inside the dome.

OPTIONAL UPGRADES FOR:

AUTOMATIC SLIT DOMES



EMERGENCY CLOSURE UPS

This Uninterrupted Power Supply is a fail-safe feature that is incorporated and only utilized for the dome to ensure self-closure in case there is a power failure.

DOME SLIT SEAL WITH WIND-DEFLECTOR

Enhanced seals for dome shutter and azimuth, adapted to either desert sites and/or high wind loads.

OPTIONAL UPGRADES FOR:

ADVANCED SLIT DOMES (HIGHSPEED)



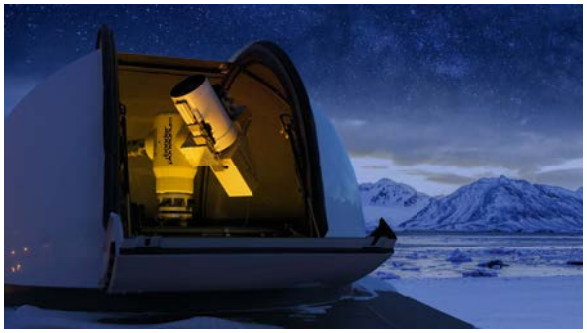
SOLAR SHIELD

For daytime operation, the roll-up shutter lessens solar radiation and thermal hot spots to form inside the dome.



HIGH-ALPINE UPGRADES

Triple layer with double intermediate insulation, enhanced mechanics for up to 300 km/h survival wind speed.



CLIMATIC PERFORMANCE UPGRADES

Structural upgrades and/or additional equipment for the dome and equipment to survive environmental conditions with temperatures down to -60° C or up to +60° C.
Optional: *Triple layer with double intermediate insulation.*



LIGHTNING MITIGATION HARDWARE

Includes lightning rods and/or service galleries as well as hydraulically engaged and remote-controlled grounding. Only recommended for sites that don‘t allow to install lightning rods separately from the dome.







ø 2.1 m

AUTOMATIC SLIT DOME

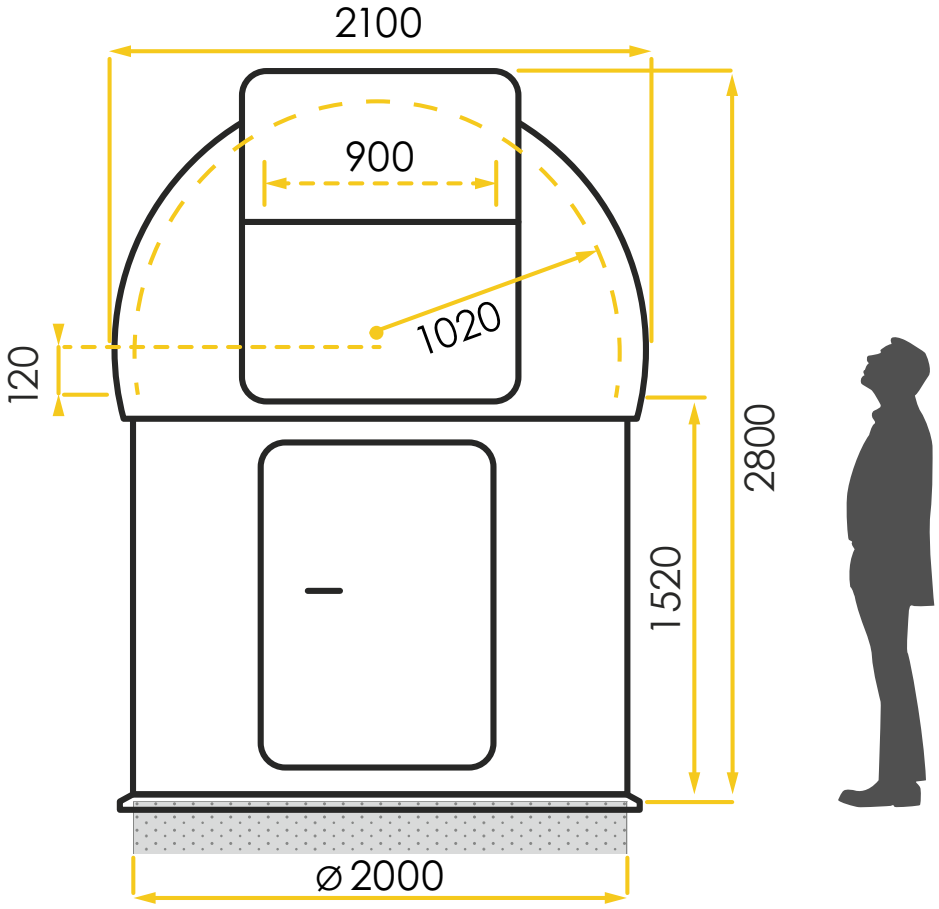
AUTOMATIC

Rotation Rate(s)	2°/s up to 8°/s
Dome emergency closing time	30 s
Weight w. short (long) cylinder	~ 490 kg (570 kg)
Power Parameters (max. peak)	230 V (2,5 kW)
Rec. Telescope Aperture	up to 320 mm

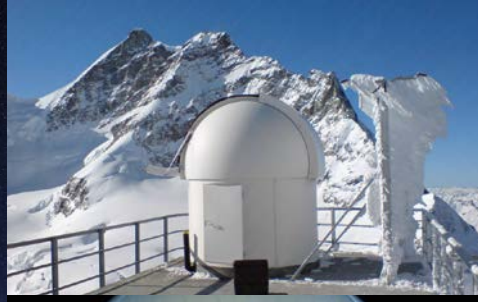
PRIVATE OBSERVATORY, GERMANY

The Baader observatory dome seems indestructible and defies all wind and weather. It must be, because it is part of my house roof. I appreciate the convenience of having my instruments quickly ready for observation. The light and wind protection the dome provides is another plus.

Dr. Reinhard Krömmelbein









⌀ 2.6 m

AUTOMATIC SLIT DOME

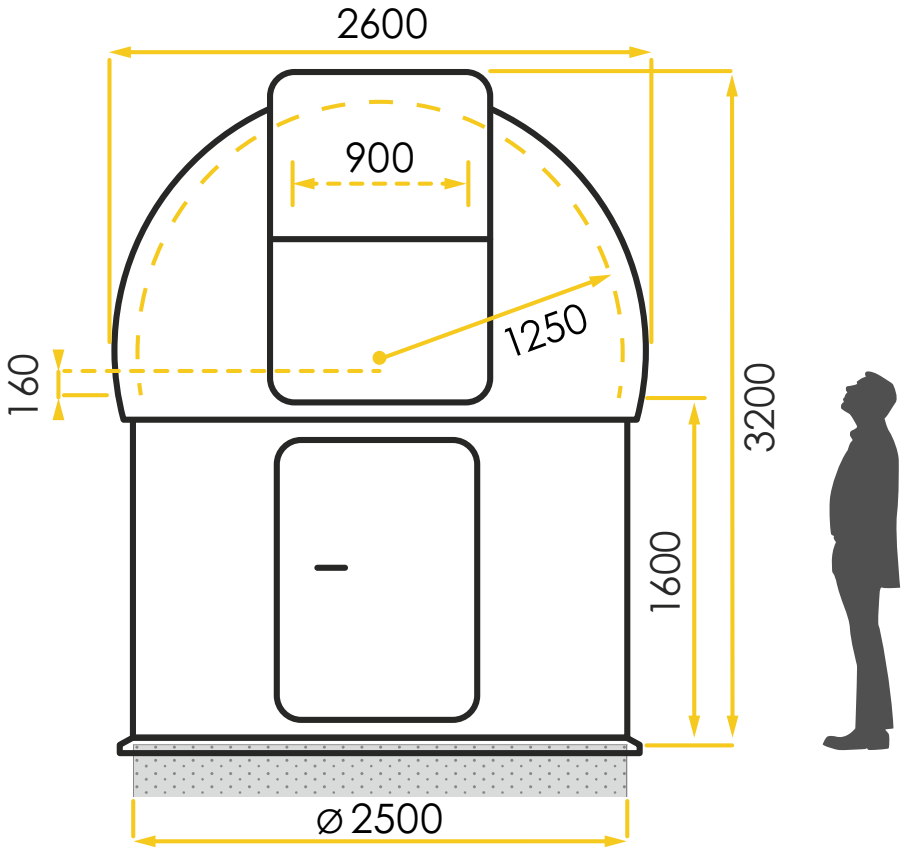
AUTOMATIC

Rotation Rate(s)	2°/s up to 8°/s
Dome emergency closing time	30 s
Weight w. short (long) cylinder	~ 700 kg (800 kg)
Power Parameters (max. peak)	230 V (2,5 kW)
Rec. Telescope Aperture	up to 450 mm

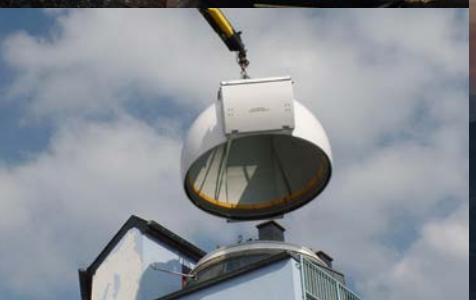
PRIVATE OBSERVATORY, SWITZERLAND

18 years from purchase I can say that the dome is mainly maintenance free. I never had any leak of rain or even snow. What I appreciate most is its thermal stability. Dome closed, the internal temperature follows the external temperature with no more than 1°C difference.

Nicolas Soldati
SoldatiSpace Observatory









ø 3.2 m

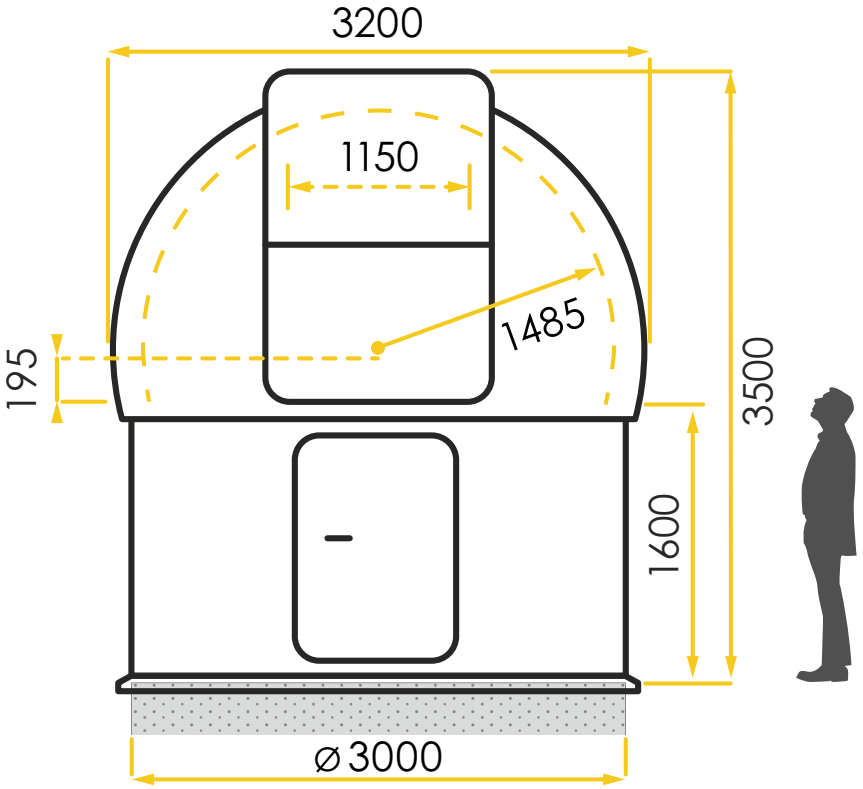
AUTOMATIC / ADVANCED SLIT DOME

	AUTOMATIC	ADVANCED
Rotation Rate(s)	2°/s up to 8°/s	2°/s up to 30°/s
Dome emergency closing time	30 s	20 s
Weight w. short (long) cylinder	~ 1.150 kg (1.320 kg)	~ 1.300 kg (1.500 kg)
Power Parameters (max. peak)	230 V (2,5 kW)	230 V (3,5 kW)
Rec. Telescope Aperture	up to 600 mm	

KOLDEWEY-STATION, SVALBARD

The dome has been functioning perfectly for 17 years now with minimal maintenance, which can be done by our own engineers. The extreme meteorological conditions, especially in the polar winter, which are comparable to those in the high mountains, have not restricted routine operation.

Dr. Christoph Ritter
AWI Foundation for Polar and Marine Research









ø 4.2 m

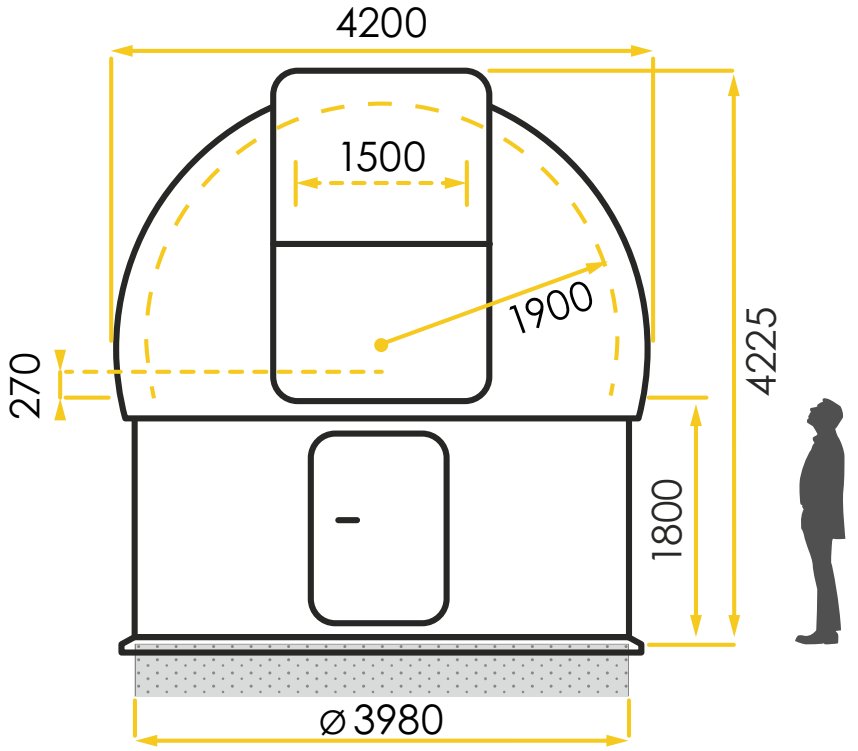
AUTOMATIC / ADVANCED SLIT DOME

	AUTOMATIC	ADVANCED
Rotation Rate(s)	2°/s up to 8°/s	2°/s up to 30°/s
Dome emergency closing time	45 s	25 s
Weight w. short (long) cylinder	~1.500 kg (1.850 kg)	~2.450 kg (2.800 kg)
Power Parameters (max. peak)	230 V (3,5 kW)	400 V 3ph (7,5 kW)
Rec. Telescope Aperture	up to 700 mm	

MT. ZUGSPITZE, GERMANY

The Schneefernerhaus at 2650 m above sea level is the highest environmental research station in Germany. For our research we have acquired two domes from Baader Planetarium to protect the highly sensitive measuring instruments from the harsh environmental conditions on the Mt. Zugspitze.

Dr. Ralf Sussmann
KIT Karlsruher Institute for Technology









ø 5.3 m

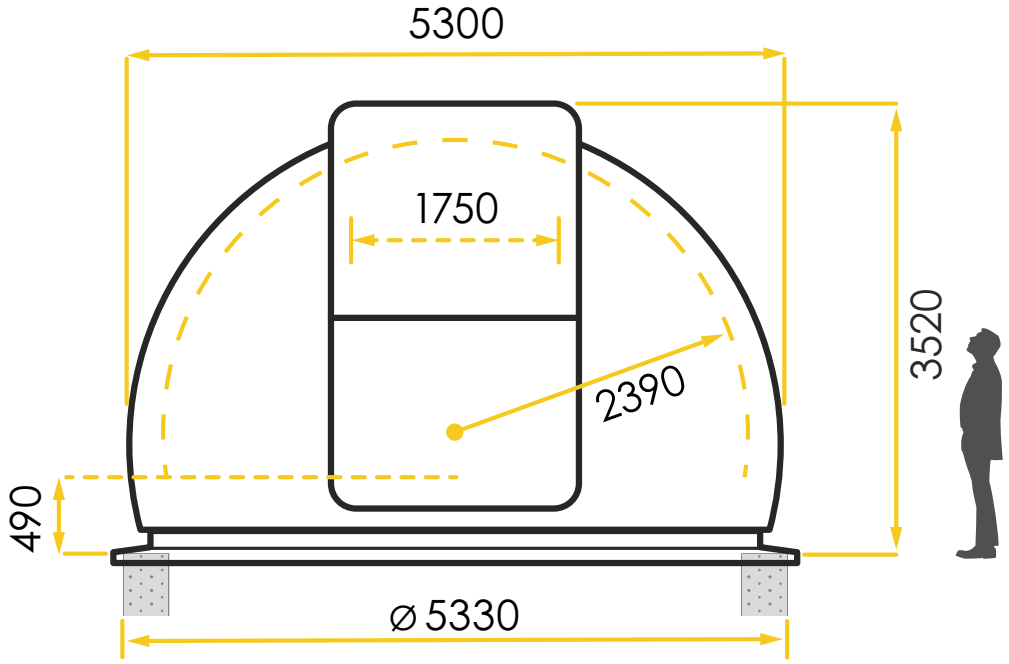
AUTOMATIC / ADVANCED SLIT DOME

	AUTOMATIC	ADVANCED
Rotation Rate(s)	2°/s up to 8°/s	2°/s up to 30°/s
Dome emergency closing time	60 s	25 s
Weight w. short (long) cylinder	~2.300 kg (2.700 kg)	~3.250 kg (3.750 kg)
Power Parameters (max. peak)	230 V (3,5 kW)	400 V 3ph (7,5 kW)
Rec. Telescope Aperture	up to 1.000 mm	

METSÄHOVI, FINNLAND

The construction of the dome is very sturdy. It can easily handle all conceivable snow and ice loads. We can even use the shutter to lift ~150kg objects inside the dome. The mechanical and electrical components are of the highest build quality.

Jyri Näränen, PhD
NLS – Finnish Geospatial Research Institute









ø 6.15 m

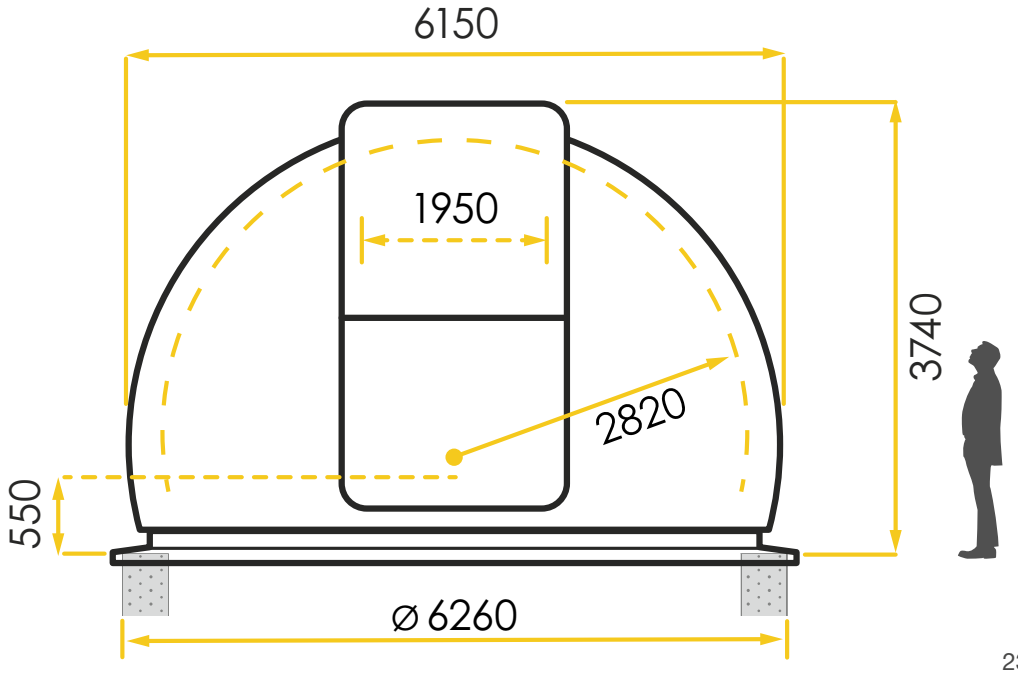
AUTOMATIC / ADVANCED SLIT DOME

	AUTOMATIC	ADVANCED
Rotation Rate(s)	2°/s up to 8°/s	2°/s up to 30°/s
Dome emergency closing time	90 s	30 s
Weight w. short cylinder	~3.100 kg	~4.000 kg
Power Parameters (max. peak)	230 V (3,5 kW)	400 V 3ph (11 kW)
Rec. Telescope Aperture	up to 1.500 mm	

ZOLLERN-ALB, GERMANY

Our 6.15m and 2x 4.2m Baader domes have been serving us excellently for 15 years now through every weather and circumstances. Despite intensive sunlight in summer, all 3 domes always stay pleasantly cool – a clear sign of the excellent (!!) insulation.

Rolf Blitzer
Zollern-Alb Observatory









⌀ 8.5 m

ADVANCED SLIT DOME

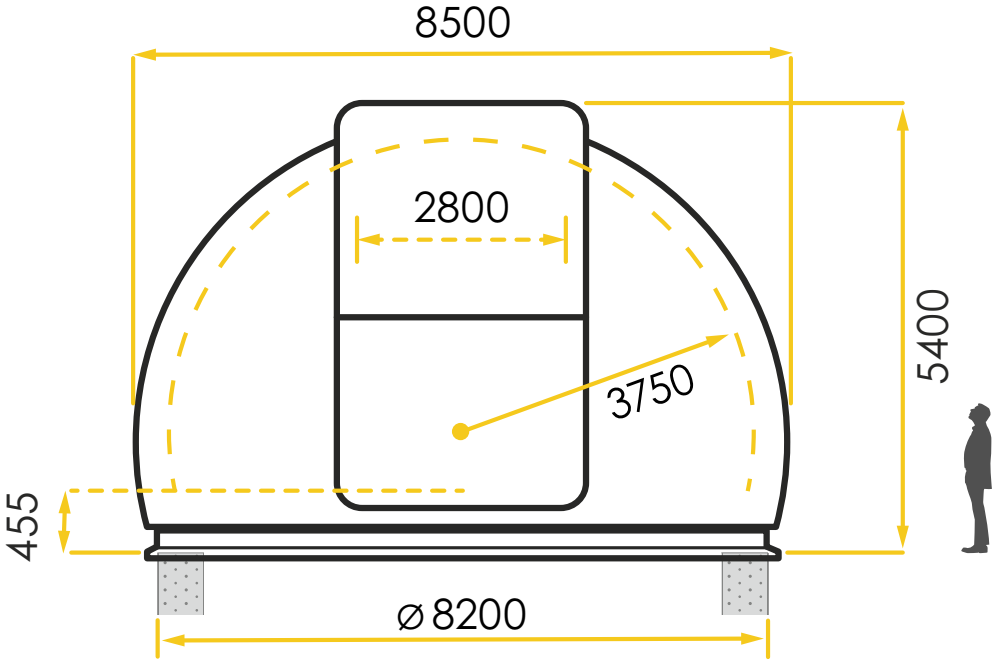
ADVANCED

Rotation Rate(s)	2°/s up to 15°/s
Dome emergency closing time	180 s
Weight w. short cylinder	up to 9.000 kg
Power Parameters (max. peak)	400 V 3ph (18 kW)
Rec. Telescope Aperture	up to 2.000 mm

MT. SKINAKAS, GREECE

Our 3m and 8m domes have successfully withstood the extreme winter weather conditions on top of Skinakas mountain (e.g. wind speeds up to 250 km/hr, frequent lightening, ice and low temperature, down to -15° C), and have protected our valuable scientific equipment.

Prof. Yannis Papamastorakis
FORTH – Foundation for Research and Technology



BAADER SLIT DOMES

OVERVIEW

AUTOMATIC SLIT DOMES

Suggested Usecase: Remote Observatory

ADVANCED SLIT DOMES (HIGHSPEED)

Suggested Usecase: 24/7, highspeed and robotic operation

Ø Dome Size		2.1 m	2.6 m	3.2 m	4.2 m	5.3 m	6.15 m	3.2 m	4.2 m	5.3 m	6.15 m	8.5 m
Rotation Rate(s)		2°/s up to 8°/s						2°/s up to 30°/s				2°/s up to 15°/s
Flap and shutter open & closing time(s)		30 s			45 s	60 s	90 s	20 s	25 s		30 s	180 s
Recommended telescope aperture		up to 320 mm	up to 450 mm	up to 600 mm	up to 700 mm	up to 1,000 mm	up to 1,500 mm	up to 600 mm	up to 700 mm	up to 1,000 mm	up to 1,500 mm	up to 2,000 mm
Slit width		900 mm	900 mm	1,150 mm	1,500 mm	1,750 mm	1,950 mm	1,150 mm	1,500 mm	1,750 mm	1,950 mm	2,800 mm
Total Mass (including either base options)	**Short Cylin.**	~ 490 kg	~ 700 kg	~ 1,150 kg	~ 1,500 kg	~ 2,300 kg	~ 3,100 kg	~ 1,300 kg	~ 2,450 kg	~ 3,250 kg	~ 4,000 kg	up to 9,000 kg
	Long Cylin.	~ 570 kg	~ 800 kg	~ 1,320 kg	~ 1,850 kg	~ 2,700 kg		~ 1,500 kg	~ 2,800 kg	~ 3,750 kg		
Power Parameters	**Voltage**	230 V (50/60 Hz)	230 V (50/60 Hz)	230 V (50/60 Hz)	230 V (50/60 Hz)	230 V (50/60 Hz)	230 V (50/60 Hz)	230 V (50/60 Hz)	400 V 3ph (50/60 Hz)	400 V 3ph (50/60 Hz)	400 V 3ph (50/60 Hz)	400 V 3ph (50/60 Hz)
	Max. Peak (incl. Ads. dryer)	2,5 kW (3 kW)	2,5 kW (3 kW)	2,5 kW (3 kW)	3,5 kW (5 kW)	3,5 kW (5 kW)	3,5 kW (5 kW)	3,5 kW (5 kW)	7,5 kW (9 kW)	7,5 kW (9 kW)	11 kW (12,5 kW)	18 kW (*custom solution*)
Wind Speeds	**Survival**	up to 200 km/h						Standard: up to 200 km/h / optional High-Alpine Upgrades up to 300 km/h available				
	Operational	up to 60 km/h (7 bft max. gusts)										
Temperature Range	**Survival**	-40°C to +60°C						Standard: -40°C to +60°C / optional Climatic Performance Upgrades available				
	Operational	-20°C to +40°C						Standard: -20°C to +40°C / optional Climatic Performance Upgrades available				
Humidity inside the dome	**Survival**	45 - 60% (Recommended: Dome Adsorption Air Drying Unit Set | Permanent humidity of 100% outside the dome is no problem)										
	Operational	45 - 100% (Operation at up to 100% humidity possible for up to 24h, afterwards humidity must be reduced to <60%)										
Dome air volume (excl. observation room)	**w.Short Cylin.**	4 m³	7 m³	13 m³	29 m³	60 m³	84 m³	13 m³	29 m³	60 m³	84 m³	237 m³
	w.Long Cylin.	8 m³	14 m³	23 m³	48 m³	89 m³		23 m³	48 m³	89 m³		
Mandatory Base Options		Short Cylinder (Wall Adapter) or Long Cylinder with Entrance Door					Short Cylinder (Wall Adapter)	Short Cylinder (Wall Adapter) or Long Cylinder with Entrance Door			Short Cylinder (Wall Adapter)	
Azimuthal drive concept		Endless dome rotation in azimuth. Friction drive mechanism by means of:						Endless dome rotation in azimuth. Geared drive mechanism by means of				
		One (1) f.d.unit	Two (2) friction drive units			Three (3) friction drive units		Three (3) geared drive units				
Encoder		Azimuth encoder with homing sensor						Absolute encoder in Azimuth and Shutter				
Material		Glass-fiber reinforced polyester (GRP), double layer with intermediate insulation										
Required RCD		All current sensitve residual circuit breaker (Typ B, Ierr = 300mA)										
Command & Control		IR-Hand Controller, RS232 and TCP/IP (Webinterface and native API)						Cable-bound Hand Controller, RS232 and TCP/IP (Webinterface and native API)				
Emergency closure	**Power Fail**	Manually / Optionally: UPS						1. layer: UPS / 2. layer: manually, hydraulically assisted				
	Weather	Weather Station included for emergency closure only, no readout										
Uninterrupted Power Supply		Optionally available (see below)						Emergency closure UPS single-phase				*provided by client*
Communication Protocol		Proprietary API (TCP/IP, RS232), ASCOM-Alpaca (TCP/IP), ASCOM (RS232), INDIGO (RS232)										
Upgrades available upon request	**All versions**	Professional Weather Station, Desert Upgrade (enhanced dust-proof seals), LED lighting red/white, Instrument lifting equipment, Dome Adsorbtion air drying unit set, Custom modifications / mounting points / throughholes etc., Input-/Output-Module										
	Specific	Emergency closure UPS (Uninterrupted Power Supply) single-phase, Dome slit seal with wind-deflector						Solar Shield, High-alpine upgrade: triple layer with double intermediate insulation, enhanced mechanics for up to 300 km/h survival wind speed, Climatic Performance Upgrades: extended operational range down to -60°C or up to +60°C, Lightning Mitigation Hardware (automatically engaged)				

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ø 2.3 – 6.5 m

BAADER ALLSKY DOMES


baader
planetarium

INTRODUCTION

BAADER ALLSKY DOMES

These domes provide a 180° full sky view with maximum interior space that can be controlled remotely, including automated operation capabilities. Each segment can move independently for optimized wind and light protection. AllSky domes come with a permanently accessible entrance door and an auto-close feature dependent on the feedback provided by the emergency weather station.



ALLSKY DOMES

Applications:

- Astronomy / Astrophotography
- Space Situational Awareness (SSA) / Space Domain Awareness (SDA)
- Free-Space Optical Communication (FSOC)
- Athmospheric and other detectors
- Defense

Sizes:

- 2.3 m, 3.5 m, 4.5 m, 6.5 m



KIT-Campus, Mt. Zugspitze – 2.3m AllSky Dome



Kent, UK – 3.5 m AllSky Dome



Argentinia – 3.5 m AllSky Dome

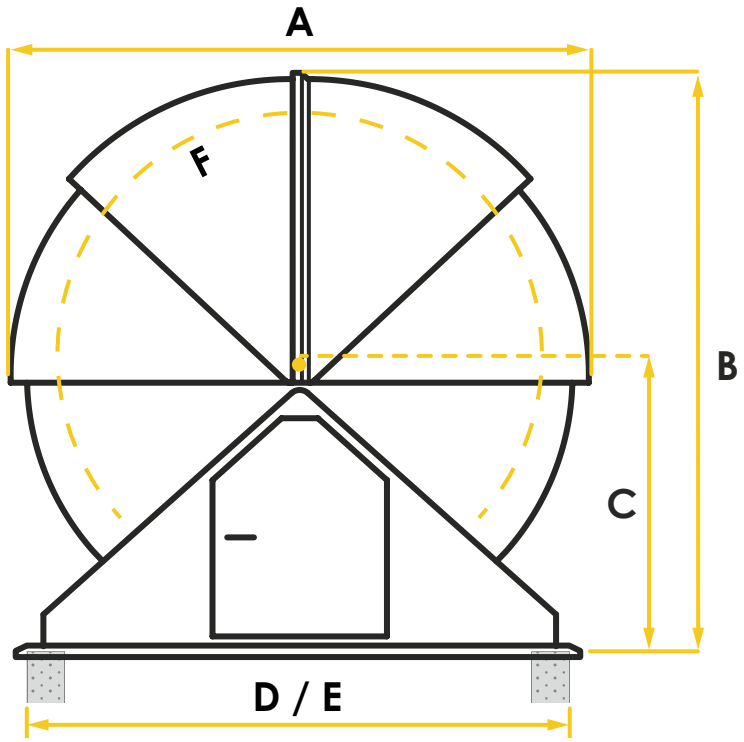


Dome C, Antarctica – 4.5 m AllSky Dome

ALL BAADER ALLSKY DOME MODELS INCLUDE:

Installation	Performed by Baader personnel at the customer site
Warranty	2 years warranty for mechanical, electronic and electric components
	10 years warranty for outer dome skin in accordance with IP54
	We warrant for 200km/h wind speed (Advanced: upgrade up to 300km/h available) to achieve undeteriorated performance and protection of the dome interior, with the dome being closed and in parking position
Fail-safe Features	Hand crank system to close dome in case of power failure
	Ready for Emergency Weather Station

MEASUREMENTS



LEGEND (all given measurements in mm):

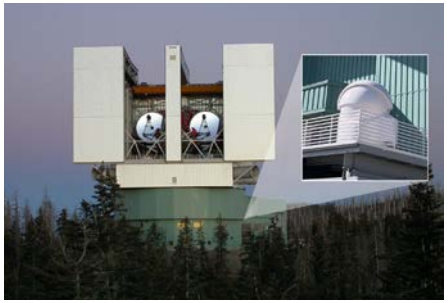
- **A** Largest dome outer diameter
- **B** Outer zenital dome height above foundation
- **C** Lowest clear horizon (spring line)
- **D** Required (oblong) concrete dome foundation width
- **E** Required (oblong) concrete dome foundation length
- **F** Unobstructed inner sphere (max. telescope moving sphere from geometrical dome center [●])



experimenta, Germany – 6.5 m AllSky Dome



SSC Space, Australia – 3.5m AllSky Dome



LBTO, Arizona (USA) – 2.3 m AllSky Dome



DLR, South Africa – 3.5 m AllSky Dome

SPECIFICATIONS

BAADER ALLSKY DOMES



SEGMENTED DESIGN

Made of Fiberglass Reinforces Polyester (FRP) with four horizontal clamshell segments that are motorized independently to shield robotic telescopes.



MECHANICS & CORROSION PROTECTION

Each segment is controlled independently by heavy duty electric motors which can be stopped and firmly held in any given up/down position. Stainless-steel components and toothed drive sections are used for all assemblies.



DOME SKIN AND THERMAL BEHAVIOUR

The white double-skin GRP with a high gloss polished finish forms a weatherproof surface that is unaffected by temperature fluctuations.



ELECTRONIC CABINET

A protrusion opposite to the entrance door built to hold the dome electronics and control equipment with a standard rack mount cabinet.



ENTRANCE DOOR

Whether the dome is fully open or closed: users can always enter and leave the dome, especially in emergency situations.



DOME CONTROL

All dome electrical functions are controlled by the internal dome microprocessor via hand controller or webinterface. All functions may also be controlled remotely via API, ASCOM or INDIGO.



INNER SURFACE

The inner surface of the dome is coated with a non-reflective paint to mitigate stray light from affecting data collection and avoid hotspots to form during daytime operation.



SEALING / CAULKING

All domes are hermetically sealed in order to prevent snow, dust, and/or storm winds from entering. This also enables the end-user to easily control the environmental conditions within.



EMERGENCY WEATHER STATION

A component that is hard-wired to the control subsystem which commands the dome to close in case of precipitation or high wind speeds.

OPTIONAL UPGRADES



PROFESSIONAL WEATHER STATION

If additional environmental situational awareness is desired for the observatory, a weather station that includes multiple sensors multiple sensors for weather data monitoring and logging.



ADVANCED PERFORMANCE UPGRADES

Structural upgrades and additional equipment can be added for the dome and equipment to survive environmental conditions with temperatures down to -80° C, wind loads of ≥250km/h, high sea state levels, and sites that are prone to lightning strikes.



CUSTOM MODIFICATIONS

For customers that require mechanical modifications with flanges and holders for individual electromechanical equipment.



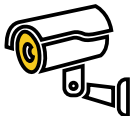
EMERGENCY CLOSURE UPS

The uninterrupted power supply is a fail-safe feature that is incorporated and only utilized for the dome to ensure self-closure in case there is a power failure.



DOME INTERIOR LIGHTING

Downward-radiating wall lights can be provided in alternating red and white light, separately controllable and dimmable.



LOCAL SITUATIONAL AWARENESS

Indoor and outdoor camera, to provide awareness of the status of your observatory (requires OMS, see page 46).



AIR DRYING SYSTEM

Depending on your site's location, an air dehumidifier is recommended to control moisture and dust levels inside the dome.







⌀ 2.3 m

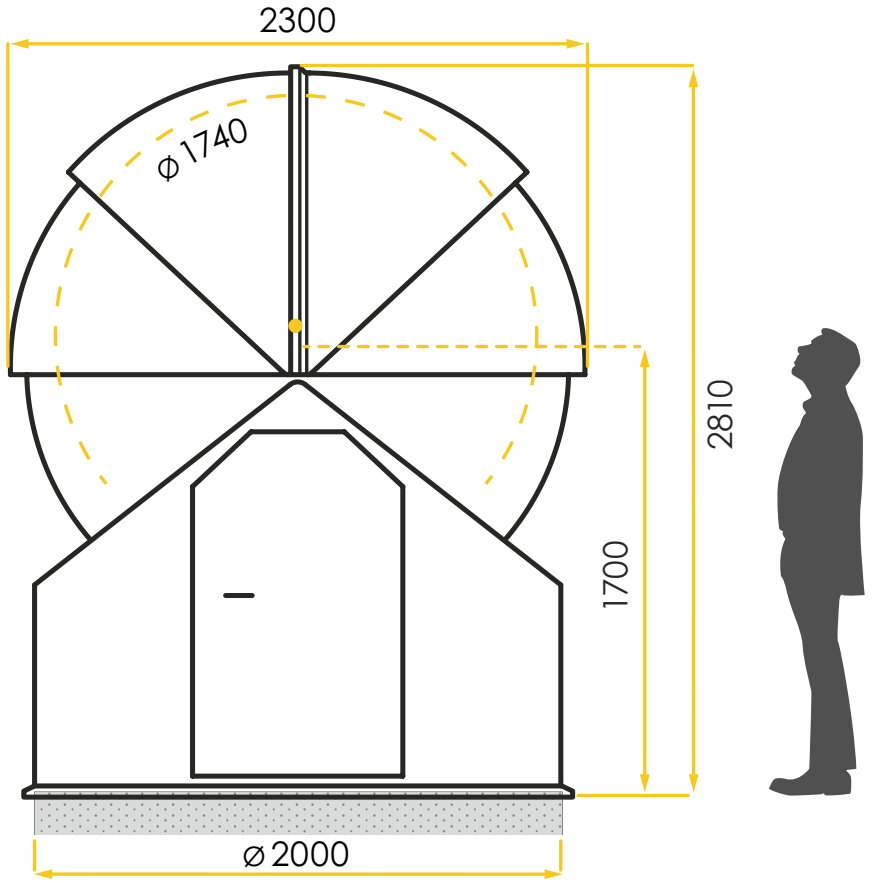
ALLSKY DOME

Dome emergency closing time	30 s
Total Weight	~ 500 kg
Power Parameters (max. peak)	230 V (3.25 kW)
Rec. Telescope Aperture	up to 400 mm

PRIVATE OBSERVATORY, GERMANY

After almost 10 months of operation, I can now say about the Allsky Dome: workmanship, function, inside and out – perfect Baader precision. All the cables and motors that are used for the function – everything is neatly assembled and many small details have been taken into consideration.

Willy Herbstreit









⌀ 3.5 m

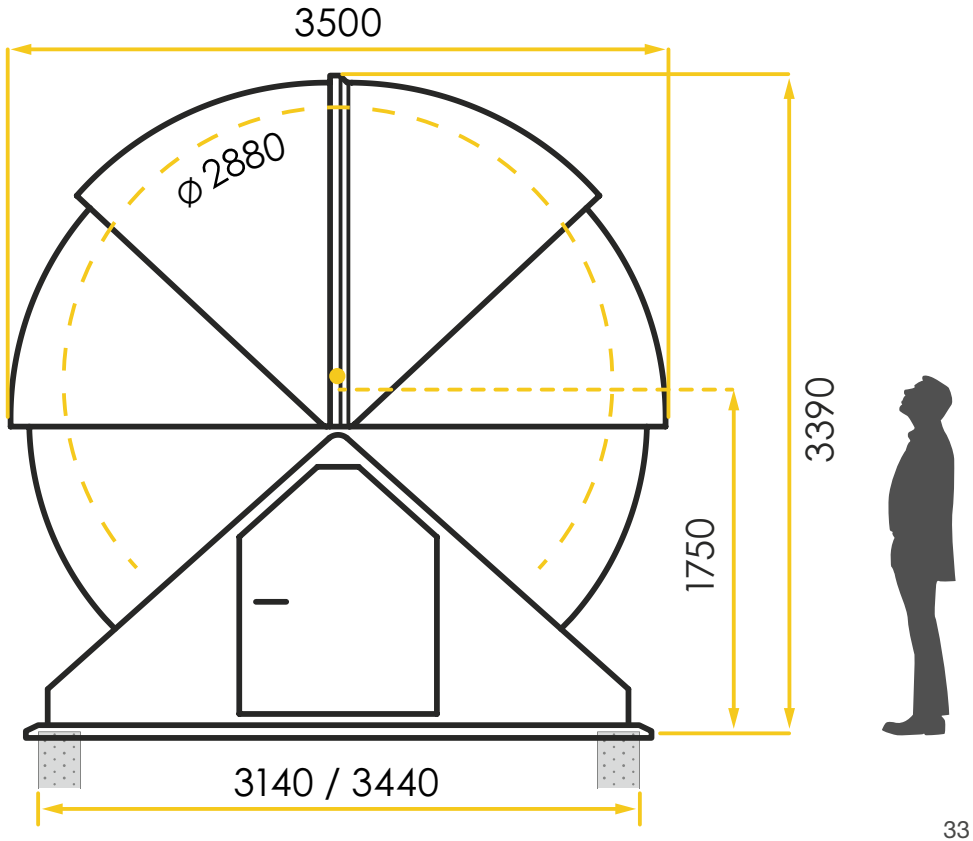
ALLSKY DOME

Dome emergency closing time	30 s
Total Weight	~ 1.300 kg
Power Parameters (max. peak)	230 V (4.5 kW)
Rec. Telescope Aperture	up to 800 mm

SAAO, SOUTH AFRICA

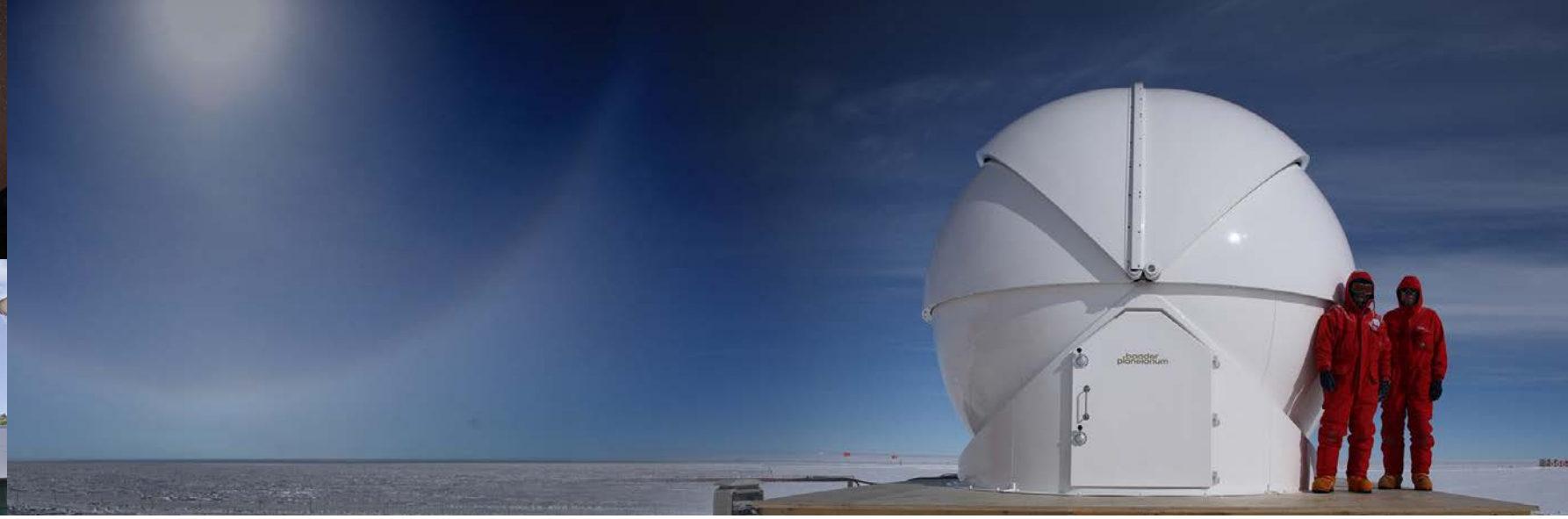
The task of this 3.5M Baader AllSky dome at the South African Astronomical Observatory (SAAO) is to screen high-flying objects for the geostationary regime. By permanently monitoring the geostationary orbit, a collision of the constantly growing number of satellites shall be prevented.

Dr. Hauke Fiedler
DLR (Deutsche Luft- und Raumfahrt)









⌀ 4.5 m

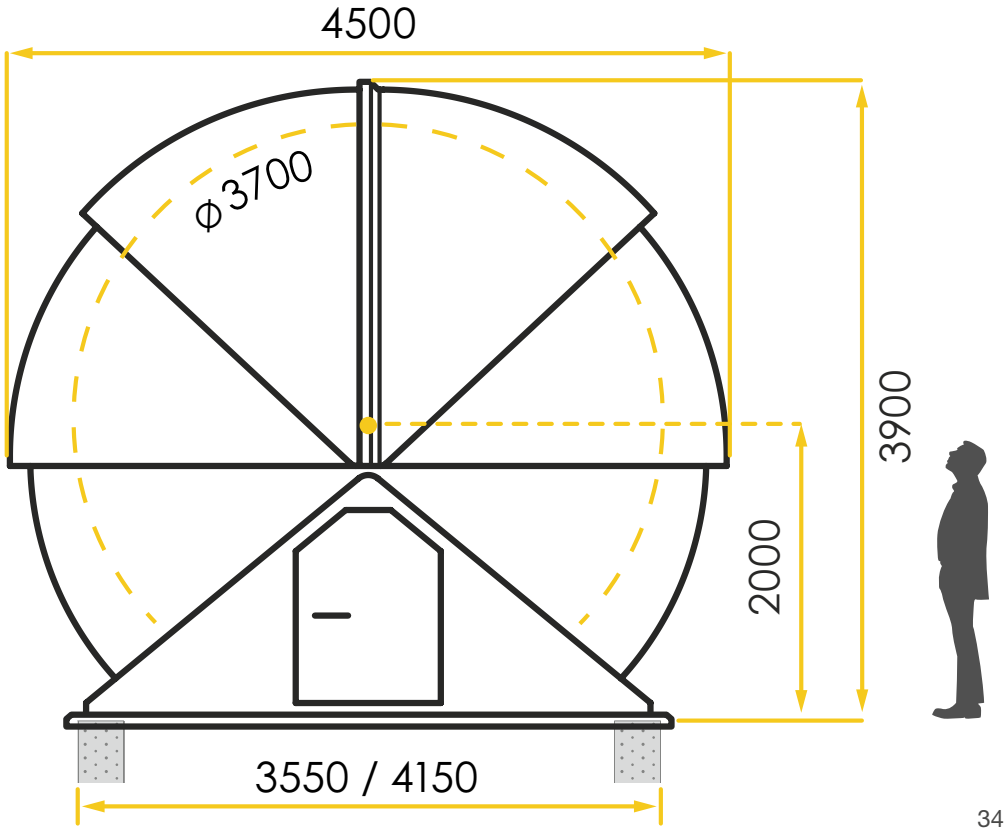
ALLSKY DOME

Dome emergency closing time	30 s
Total Weight	~ 2.000 kg
Power Parameters (max. peak)	230 V (4.5 kW)
Rec. Telescope Aperture	up to 1.000 mm

PRIVATE OBSERVATORY, GERMANY

My observatory has been delivered „turn-key“ (including all equipment and accessories) by Baader Planetarium. The dome is the most important part of an observatory. For me, only a Baader dome can be considered as a protective structure against wind, raind and snow for my entire instrumentarium.

Günther Jilg







ø 6.5 m

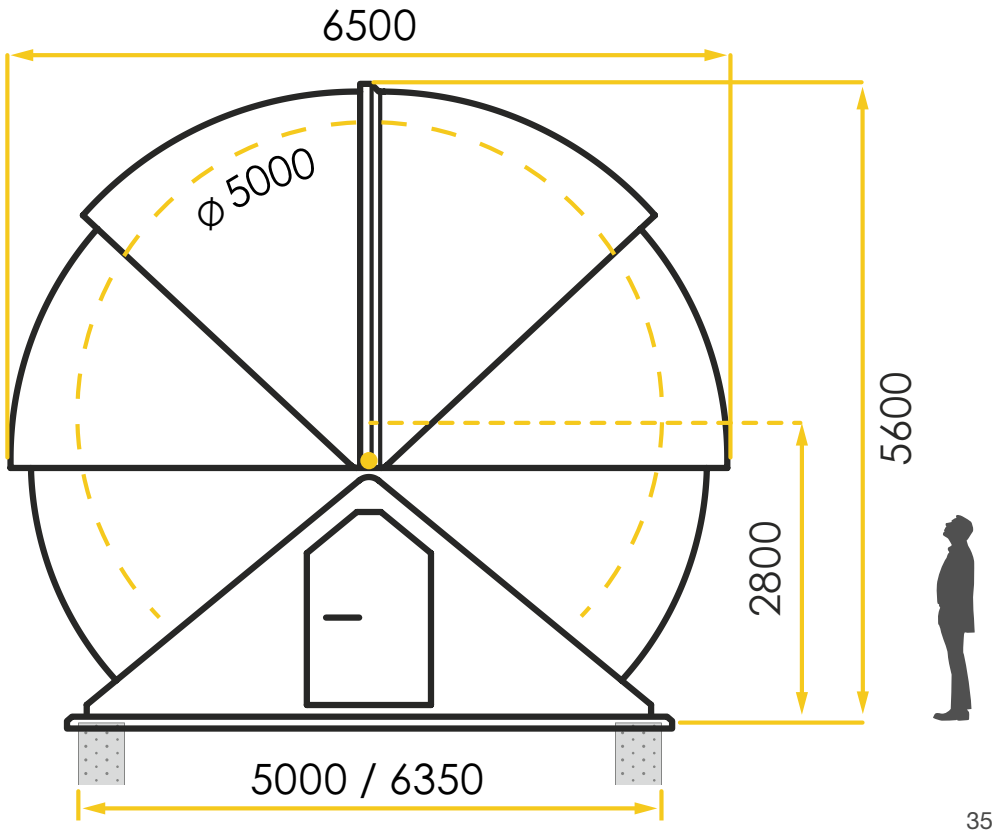
ALLSKY DOME

Dome emergency closing time	60 s
Total Weight	~ 5.000 kg
Power Parameters (max. peak)	400 V 3ph (22 kW)
Rec. Telescope Aperture	up to 1.750 mm

SALZBURG, AUSTRIA

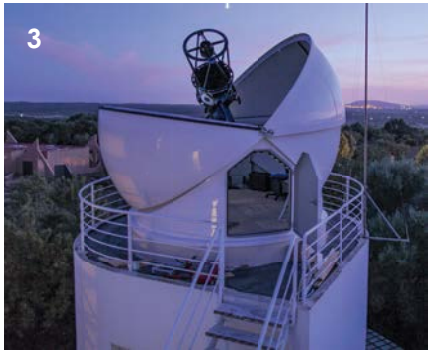
The 6,5m AllSky-Dome of VEGA-Observatory in Salzburg houses a 1m reflector, the largest telescope in Austria available for public observations. The reliable system is easy to operate by our volunteers which resulted in a great Google-rating by our thousands of visitors.

Helmut Windhager, Dr. Lothar Kurtze
VEGA-Observatory













1. 6.5 m AllSky + 6.15 m Slit Dome for Haus der Natur, Austria
2. 2.3 m AllSky Dome for Max-Planck Institute, La Palma
3. 4.5 m AllSky for Hamburg University, Mallorca
4. 4.5 m & 3.5 m AllSky Dome for The Open University, Tenerife
5. 3.5 m AllSky Dome for Hellas Sky, Greece

BAADER ALLSKY DOMES

OVERVIEW

ALLSKY DOMES

Ø Dome Size		2.3 m	3.5 m	4.5 m	6.5 m
Segments open & closing time(s)		30 s (Highspeed Upgrade Available)			60 s (Highspeed Upgrade Available)
Recommended telescope aperture		up to 400 mm	up to 800 mm	up to 1,000 mm	up to 1,750 mm
Total Mass		up to 500 kg	up to 1,300 kg	up to 2,000 kg	up to 5,000 kg
Power Parameters	Voltage	230 V (50/60 Hz)	230 V (50/60 Hz)	230 V (50/60 Hz)	400 V 3ph (50/60 Hz)
	Max. Peak (incl. Ads. dryer)	3.25 kW (3.75 kW)	4.5 kW (6 kW)	4.5 kW (6 kW)	22 kW (23.5 kW)
Wind Speeds	Survival	Standard: up to 200 km/h / optional High-Alpine Upgrades up to 300 km/h available			
	Operational	up to 60 km/h (7 bft max. gusts)			
Temperature Range	Survival	Standard: -40°C to +60°C / optional Climatic Performance Upgrades available			
	Operational	Standard: -20°C to +40°C / optional Climatic Performance Upgrades available			
Humidity inside the dome	Survival	45 - 60% (Recommended: Dome Adsorption Air Drying Unit Set | Permanent humidity of 100% outside the dome is no problem)			
	Operational	45 - 100% (Operation at up to 100% humidity inside possible for up to 24h, afterwards humidity must be reduced to < 60%)			
Dome Air Volume		8 m^3	23 m^3	41 m^3	129 m^3
Material		Glass-fiber reinforced polyester (GRP), double layer with intermediate insulation			
Required RCD		All current sensitve residual circuit breaker (Typ B, Ierr = 300mA)			
Command & Control		IR-Hand Controller, RS232 and TCP/IP (Webinterface and native API)			
Emergency Closure	Power Fail	Manually (auxillary electric drive) / Optionally: UPS			
	Weather	Weather Station included for emergency closure only, no readout			
Communication Protocol		Proprietary API (TCP/IP, RS232), ASCOM-Alpaca (TCP/IP), ASCOM (RS232), INDIGO (RS232)			
Mandatory Base		Round concrete wall base	Oblong concrete wall base		
Upgrades available upon request		Absolute Encoders, Highspeed Segment Open/Closing times, Uninterrupted Power Supply, Professional Weather Station, Climatic / Environmental Perfomance Upgrades, Custom Modifications / Mounting Points, Lightning Mitigation			

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SLR / SSA / LASERCOM

ADVANCED APPLICATIONS



ADVANCED APPLICATIONS

SLR / SSA / LASERCOM

Baader Planetarium specializes in manufacturing domes for advanced Ground Stations for SLR (Satellite Laser Ranging), SSA (Space Situational Awareness), and Lasercom applications. Leveraging years of industry experience, we deliver robust solutions that stand out for their secure protection of high-value equipment, even under the most extreme environmental conditions. Our engineering expertise has garnered the trust of esteemed clients like NASA, Swedish Space Corporation, DLR and ESA. Whether it‘s enabling precise satellite tracking, space debris monitoring, or cutting-edge laser communication, our Ground Stations are designed to meet the rigorous demands of today‘s space missions.

FEATURES

- **Robust Design:** Engineered to operate under extreme environmental conditions, safeguarding high-value equipment
- **High-Speed Dome Technology:** Specialized domes with up to 35°/s rotation for rapid satellite tracking and space debris observation
- **Trusted Partnerships:** Long-standing collaborations with prestigious organizations like NASA, ESA, SSC, DLR and many more
- **Precision Ranging:** Cutting-edge drive technology for accurate satellite tracking and distance measurement.
- **Innovative Laser Communication:** Supporting pioneering work in the field of Lasercom for fast and secure data transmission in space since 20 years.
- **Turnkey Solutions:** Complete observatories including telescopes, cameras, and control systems

INDIVIDUALLY TAILORED TO YOU

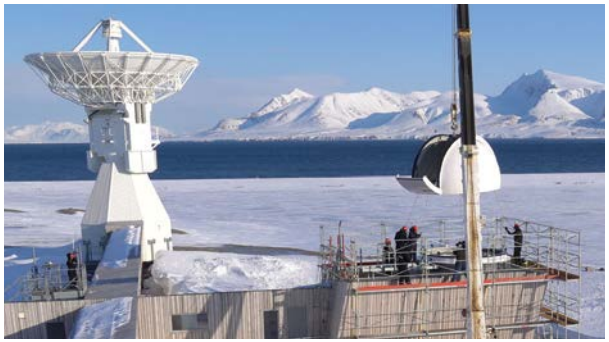
We would be pleased if you contact us regarding your SLR / SSA / Lasercom project at **www.baader-planetarium.com/dome-requests**



SLR / SSA / LASERCOM

ADVANCED APPLICATIONS

ADVANCED SLIT DOMES (HIGHSPEED)



SLR GROUNDSTATIONS

Our high-quality domes have found applications beyond astronomy, including Laser Ranging projects for almost 30 years. Designed for durability and reliability, our constructions meet the strictest professional standards and high availability also at day time.



SSA GROUNDSTATIONS

Our robust observatories serve the Space Industry‘s growing need for SSA ground stations in remote locations. We offer special high-speed drive mechanics for fastest positioning and tracking of low-orbit satellites or to enable instant view for fast moving survey instruments.



LASERCOM GROUNDSTATIONS

Our highspeed domes can be outfitted with solar shields for satellite tracking and laser communication during daylight. Features like integrated UPS and emergency weather stations ensure the safety of your instruments under any circumstances.

NYALESUND, SVALBARD

I wanted to thank you and your team for the excellent conclusion of the installation of the dome in Ny-Alesund. (...) The testing went very well and we and NMA were happy with the results. (...) Thank you for making this project successful.

Scott Wetzel
NASA – National Aeronautics and Space Administration

WESTERN AUSTRALIA SPACE CENTER

The establishment and commissioning of the SSA station was a success. Now begins the exciting times of configuring the remote control and operations environment of the station, calibrating, testing the processing chain and then start our campaigns.

Jacob Ask, Program Director
SSC – Swedish Space Corporation

IZAÑA-STATION, TENERIFE

While dozens of laser tracking stations are dotted around Europe, the Izaña station's dual functionality makes it a first. (...) It can also be used for optical communications and is intended to become a state-of-the-art, fully autonomous robotic system.

ESA – European Space Agency
via our partner DiGOS


TURN-KEY
OBSERVATORY
SOLUTIONS


baader
planetarium
baader
planetarium

FROM ONE SOURCE

TURN-KEY OBSERVATORY SOLUTIONS

With 50+ years of experience, Baader Planetarium provides turn-key observatory solutions that include services from conceptualization up to installation and training. Depending on your application and mission parameters, we can also guide you through the process, including selection of the optimal equipment and software that is controlled by our Observatory Management System (OMS).

SPECIFICATIONS



- **Turn-key observatories** utilizing Classic Slit or AllSky domes that range from 2.1 - 8.5m
- **Various electronic equipment configurations**, that allow you to setup a classic observatory or one with remote access that can be fully autonomous
- **Tailored to your requirements,** suitable for amateur astronomers as well as for schools, universities, research institutes and commercial customers.

> *The whole is greater than the sum of its parts*
>
> Aristotle

INDIVIDUALLY TAILORED TO YOU

We would be pleased if you contact us regarding your observatory project at **www.baader-planetarium.com/dome-requests**

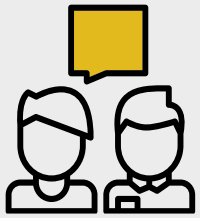


TURN-KEY SERVICES



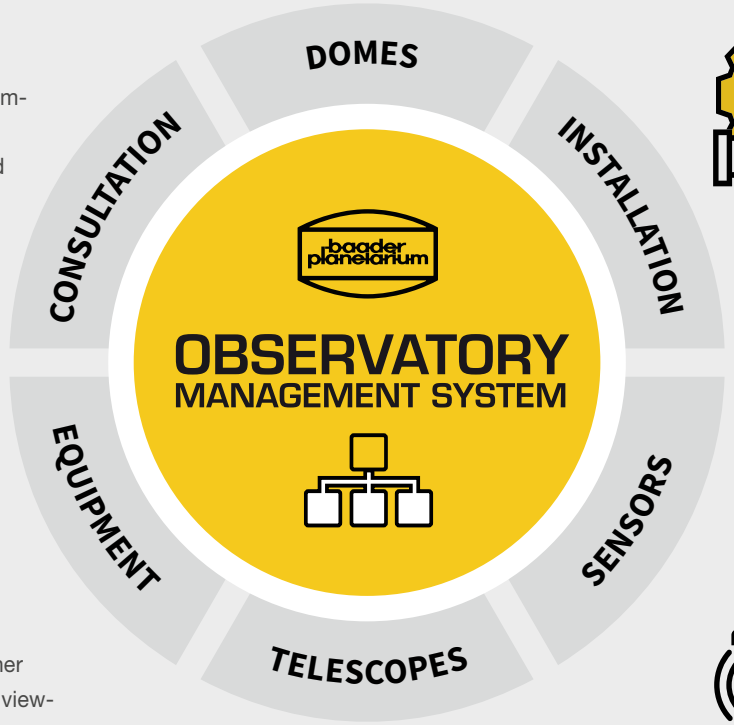
BAADER DOMES

Whether it be a Classic Slit or an AllSky dome, different configurations are possible to meet your needs.



CONSULTATION & PLANNING

We assist by providing recommended solutions that are tailored to your location and requirements.





INSTALLATION & TRAINING

Our team ensures that your observatory is installed in accordance to the highest standards and we also provide training to the end-users.



ACCESSORIES

The right adapters, plates, and other accessories such as eyepieces or viewfinders are meticulously selected.



SENSORS & PHOTONICS

Different sensor and photonic equipment configurations can also be integrated as part of our solution offerings.



ROBOTIC TELESCOPES

We can equip your observatory with the desired telescope, mount, and pillar setup.

OBSERVATORY MANAGEMENT SYSTEM (OMS)

The OMS is your entry into remote operation: it is designed to function as your entire control center of all components in the observatory. It is therefore equipped only with high-grade and long-lived components. The OMS is delivered completely preconfigured and tested with your actual hardware by our astro-experienced IT-personnel, so you can start to do your remote observations from day one.



SPECIFICATIONS

- **Stainless steel switch cabinet housing (A) with controlled ventilation:**
  - Windows operated industrial computer with OMS Router for external connection to customer network and hosting the entire observatory intranet.
  - Preconfigured with all ordered and additionally necessary software packages to run your entire observatory.
  - Separate power supplies for mount and 12V equipment
  - Industrial network switch
  - Network-based power switch to enable remote controlled reset of core components
  - Secondary lightning protection of the network and power system
  - **External Interfaces:**
    - Ethernet
    - USB 2.0 Type-A ports
    - 230 V EU Type-F plug (or other types depending on country and intake)
    - On / Off switch
  - **Internal Interface for integration:**
    - Customer Ethernet
    - 110 - 240 V AC supply voltage
    - 4x USB 3.0, 2x native RS232, HDMI, Various I/O ports for signals and much more
- **Baader OMS-Hub (B)** that is mounted on the remote telescope for the equipment and sensors with the following interfaces:
  - 4x 12V/5A Outputs, 1x 12V CCD High Power Output
  - 4x USB 3.0 Type-A ports



A



B

FIND YOUR SUITABLE TURNKEY OBSERVATORY

TYPES OF OBSERVATORIES



CLASSIC OBSERVATORY

Suitable for on-site operation using manual control interfaces for the selected telescope configuration. The slit dome's azimuth movement is the only sub-system that is motor driven via the hand controller.

PRIVATE OBSERVATORY, GERMANY

The stability of the whole construction is remarkable. During the observation with a Baader Microguide eyepiece on the Celestron C11, I touched the sand filled column, knocked on it and leaned against it. The image in the eyepiece could not be shaken by anything!

Andreas Bringmann
Astrophotographer



REMOTE / ROBOTIC OBSERVATORY

These types of observatories can be utilized for multiple applications. All dome functions can be performed remotely and shall always have the capability of being operated by the hand controller, a computer interface, or the OMS.

OBSERVATORIO DEL TEIDE, TENERIFE

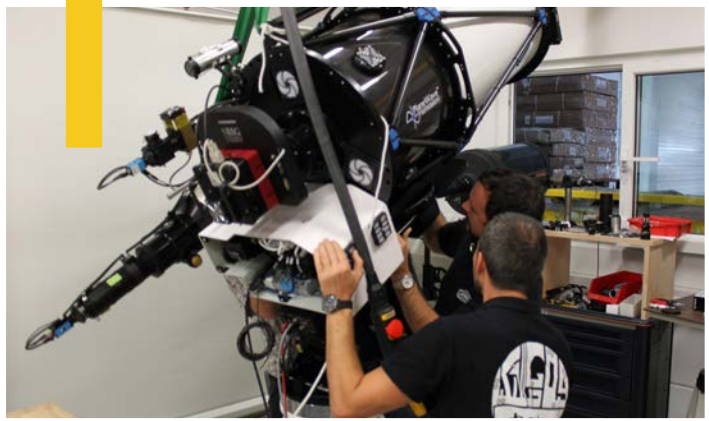
Our two (3,5m and 4,5m AllSky) autonomous robotic facilities PIRATE and COAST enable our distance learning students to experience authentic astronomical research, our astronomy research group to conduct competitive research projects, and the general public to engage with astronomy via the web portal.

Dr. Ulrich Kolb
The Open University

TURN-KEY OBSERVATORIES

STAGES OF CONSTRUCTION

1 TESTING IN OUR FACILITIES



All observatory components and assemblies are tested in-house for quality control.

2 CONTAINER LOADING AND SHIPPING



We pack and coordinate shipping to the designated destination.

3 DOME AND TELESCOPE INSTALLATION



The team inspects all components and installs your observatory.

4 FIRST LIGHT



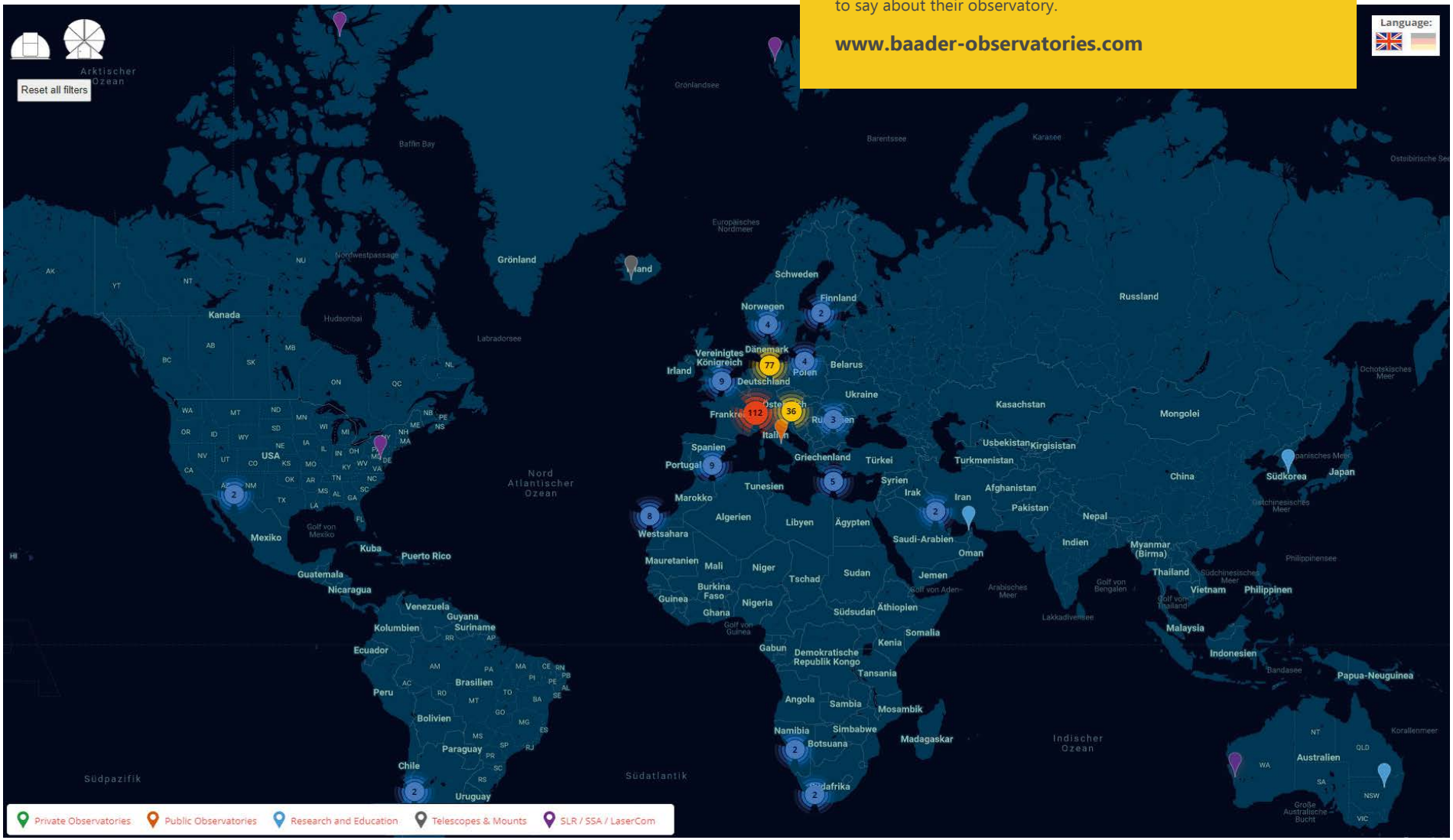
Once installed, the team takes the first astronomical image to ensure functionality and system performance.

BAADER OBSERVATORIES

AROUND THE WORLD

On our observatory world map you can see all the installations we are allowed to present with a multitude of pictures and information. Discover what the owners of our domes (even after decades) have to say about their observatory.

www.baader-observatories.com



DISCOVER

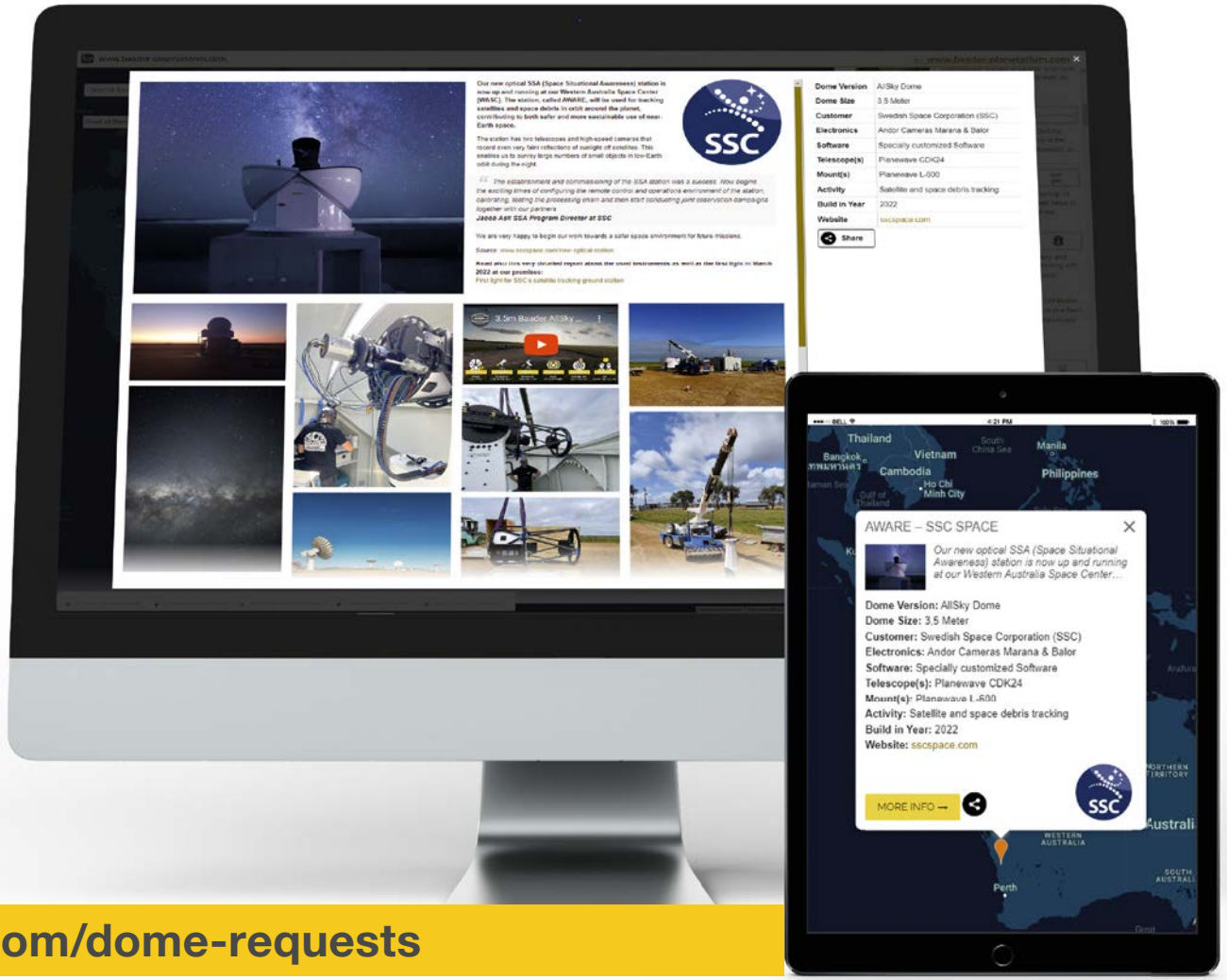
BAADER OBSERVATORIES

WE WOULD LIKE TO SEE YOU BE ADDED TO OUR WORLD-WIDE DOME INSTALLATIONS.

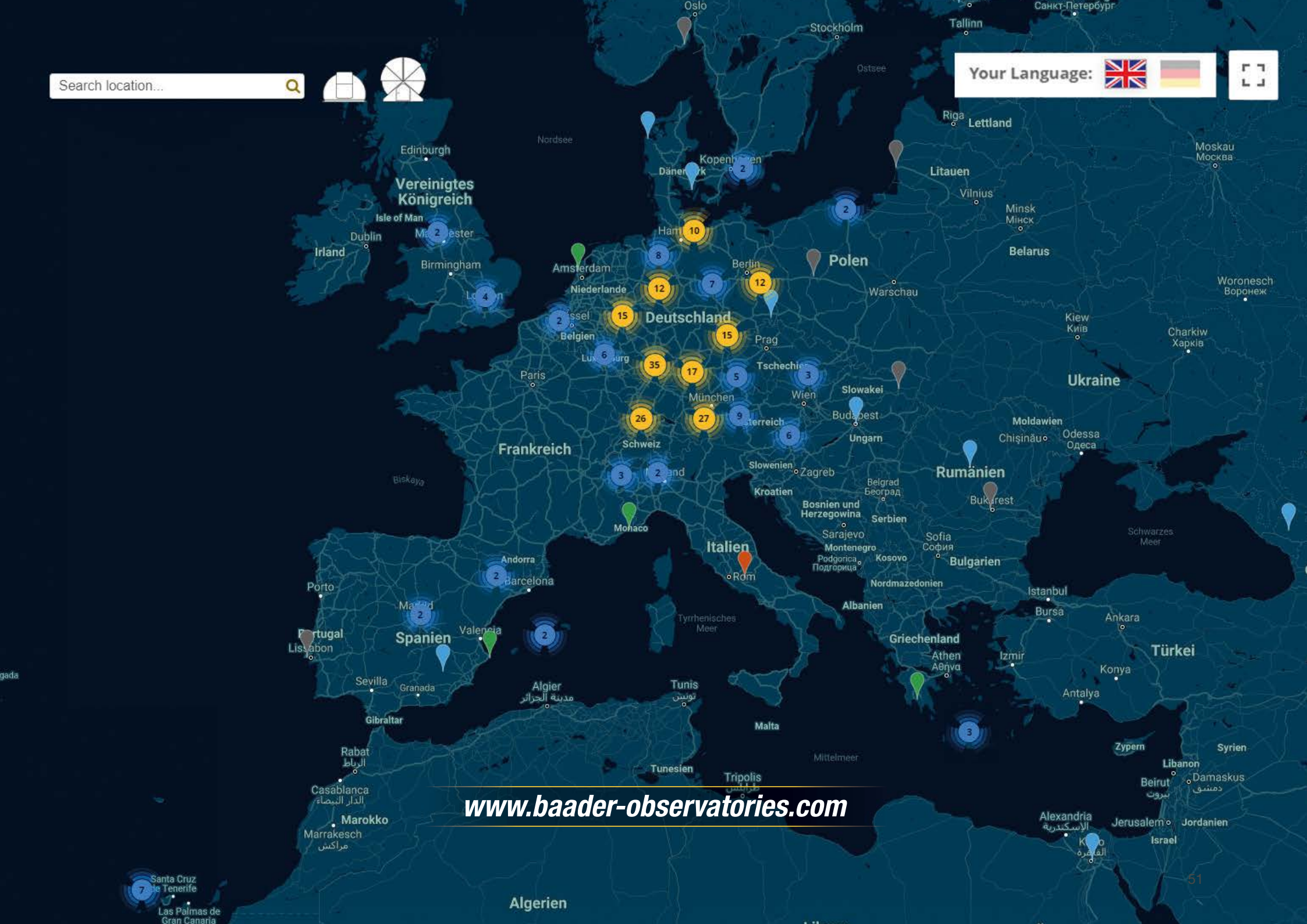
Please let us know how we can help you within your desired application by contacting us at:

kontakt@baader-planetarium.de

+49 (0)8145 / 8089-0



www.baader-planetarium.com/dome-requests


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60 YEARS

baader planetarium



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