From Telescope Composter to Observatory

If your astronomical instruments have reached a size that they can no longer be used for mobile purposes, or if one would like to dispense with recurring assembly and disassembly, a small observatory of its own is the logical consequence. In most cases, however, too little attention is initially paid to the actual function.

As it happened to me, I wanted my 12" Foto-Newton permanently, so that he can is well protected and always ready for use at short notice. Usually the experienced amateur astronomer advises as a protection – a sliding roof hut, which is relatively inexpensive and can be built with a lot of personal effort. Also it has the advantage that the curious stroller does not have to immediately draw conclusions about the valuable contents can. An obvious disadvantage is the relatively large the floor area of such a hut for the lateral the high walls that make up the roof and the telescope inevitably surrounded, a large to isolate and a complex surface to be implemented, motor opening of the roof. Everything should operated remotely from my house. Since the market does not offer any mature solutions for this, the I would probably have had to construct and build the protective structure myself.

My crafting skills had allowed me already found some new friends at the local rescue service, which is why I prefer to go for a ready-made Observatory about the trade. The dome should the rotation of the earth is motorized and synchronized to the mount. The diameter should be between two and two and a half meters are enough to observe
an upright posture would be advantageous. In fact, the European market is very thin in this respect, with only four suppliers available. Importers in Germany offer domes from England (Pulsar), Poland (ScopeDome – also offered in Germany under the name "Omegon) and Australia (Sirius), Baader-Planetarium produces its domes directly in Germany.

The first dome

I opted for the inexpensive British model with a diameter of 2.1 meters, had a foundation cast in the garden and built the simple construction with my reduced manual skills and my girlfriend within one weekend.

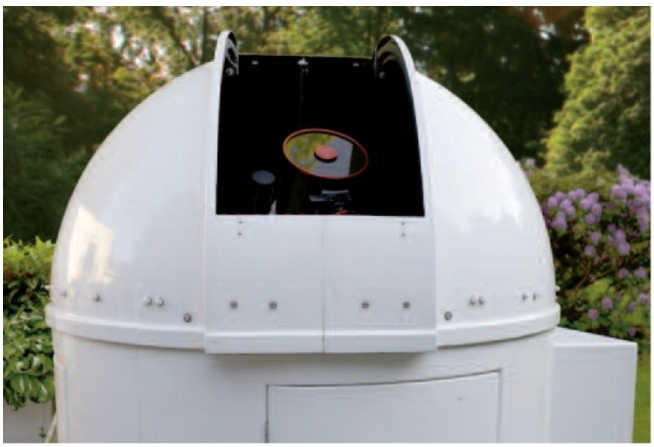
Motor and gear rim subsequently installed by ScopeDome from Poland

The dome control with motor, gear rim and electronics came from ScopeDome from Poland and was adapted to my model by a metalworker. Due to the multitude of new, externally visible counter nuts, the dome now looked like Peter Fonda's rivetted trousers from the film Easy Rider. The mount and the telescope were installed on a low 100 cm column.

Just under 10.000 euros was the total investment in the most economical and operational model available in Germany. The dome gap must be opened manually by means of a rope pull before operation.

But only practice should show that this model is far away from an observatory as I imagined it to be. The susceptible dome control, which runs over the ASCOM

The whole pride: 2011 newly erected GFK observatory from England in my garden



Caused by the installed gear rim of the dome drive many new counter nuts decorate the protective structure

driver, did not always convert the received signals into a dome movement, so that from time to time the dome gap shaded the picture. Also it turned out that the slit with 65 cm width and almost no zenith depth was much too narrow for a 12"-Telescope and too short at the top. A lot of rejects on recordings in the rare lunar free and clear Nights were the result. The exact opposite is what this observatory was supposed to do. Also the visual Observation with refractor or Schmidt-Cassegrain was no joy. Due to the low internal height only a low column can be used, which is a good idea when looking into the eyepiece, which required dislocations, which are actually reserved only for users of the Kamasutra. My intervertebral discs hated that!

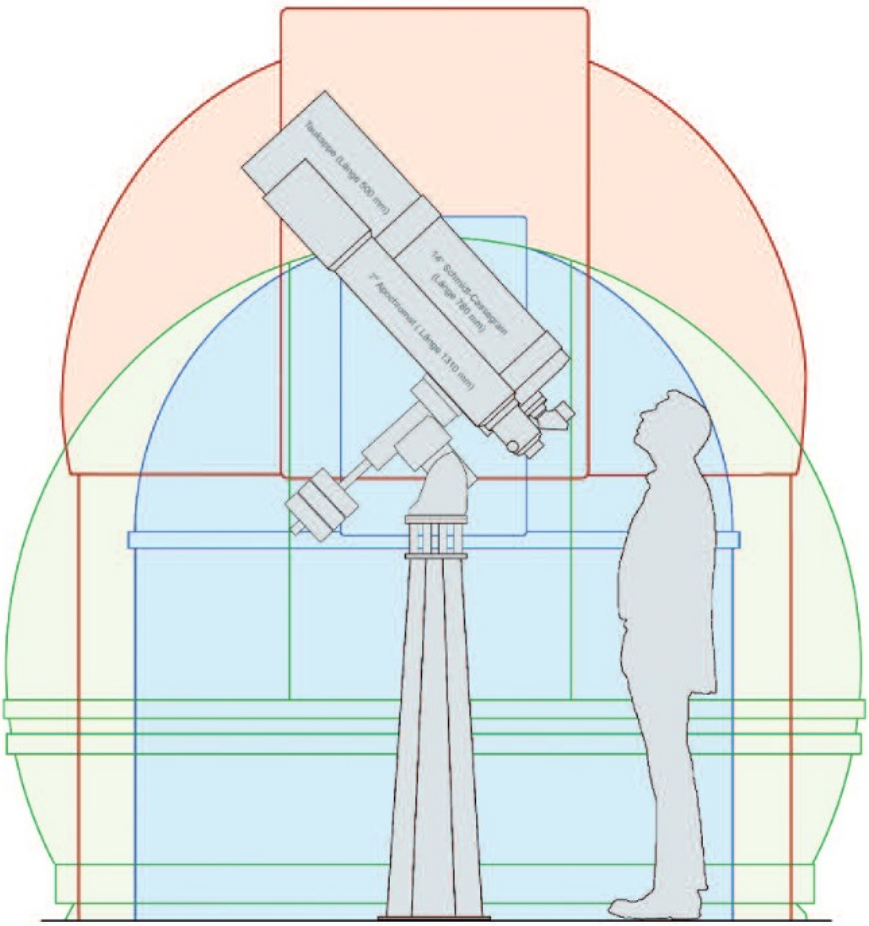
But the biggest disadvantage was the rather open, non-insulated and non-sealed construction. Despite the white reflective coating, the dome became very hot during the day. The air humidity penetrated unhindered through many cracks and settled on all equipment. Hanging and threatening drops in the dome over the telescope were in the three wet seasons the normal case. Also the collected, creeping fauna of the Central European insect world was happy about a wind-protected new home and eagerly built nests. The humid microclimate also stimulated moss formation in the corners and a small fungus was sighted. No, my telescopes should not be composted!

To at least counteract the humidity, I used a dehumidifier at temperatures above five degrees, including a heater. By the way, the aforementioned animal world also found this great and prospered magnificently. The cost of electricity and frustration rose – after all, I heated and dried half of the garden. Actually, this supposed observatory was nothing more than a roof, which kept direct rain and wind away, but generated many new problems.

In search of an observatory

After two years of entomology I decided to use larger instruments and wanted to take this opportunity to look for an observatory worthy of the name. So there were Sirius from Australia, ScopeDome from Poland and Baader Planetarium from Mammendorf left. Before making a purchase decision, I wanted to personally inspect all models.

The importer of the Australian dome could not show me a model, but the Polish model was presented to me under the name "Omegon" at a trade fair. It has no substructure, the entire dome with a proud diameter of three meters and a generous gap of one meter is



Comparison of dome dimensions to scale: Blue is my previous model of Pulsar, green the 3 meter dome of ScopeDome and red the 2.6 meter Baader model.
Also marked is a 140 cm high column with GM2000HPS mount and two of my favourite instruments. For a better estimation of the dimensions a 185cm tall person stands next to it.

This drawing reveals that due to the low height of my old dome and the ScopeDome, no instruments can be installed on paralactic mounts at a height that guarantees relaxed observation.

moved by a turntable mounted directly on the ground. I was already familiar with the built-in, unreliable electronics. Also this impressive model was neither isolated, nor were the gaps in the lower area somehow sealed. Another disadvantage is that the optionally available door (if you don't want to enter through the dome gap) rotated due to the design.

I was able to find an owner within reach of my place of residence and thus obtain first-hand information from the practice. There I learned that although the dome has an outer radius of three meters at its widest point, the space for moving is provided by the However, the slewing ring and motor are reduced to approx. 2.4 m. That one probably often at night at the open mounted engine would remain stuck and the tiny but sharp gear rim unprotected, he mentioned on the side. Also, the height of only 2.4 m for larger only to use instruments if you can use the Telescopes mounted on an extremely short column, which again a relaxed observation hardly possible meight – somehow my intervertebral discs knew that. I rejected the idea of raising the entire dome through a pedestal, as I would need a ladder on both sides to get in. Since this dome incl. construction already cost around 15.000 Euro, I created a comparison drawing to compare the pros and cons of all three models of my selection. Beside my previous dome the model of ScopeDome and Baader Planetarium was drawn in. Also two of the biggest new wish instruments on my Monand a column, the height of which allows the observation in the proximity of the zenith with my height of 1.86 m halfway free of cramps allowed. The result was sobering.

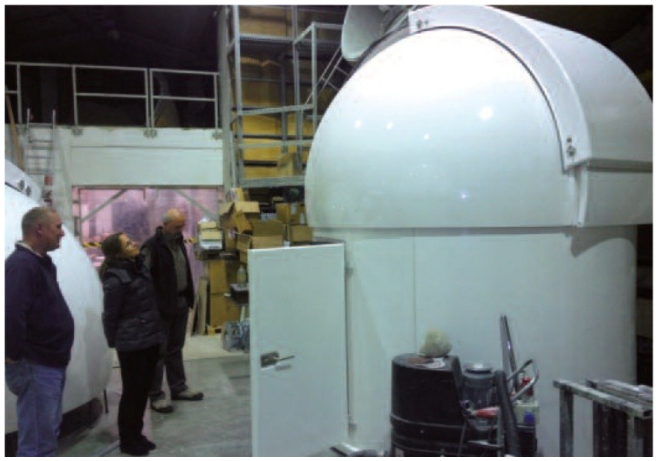
Since the Polish dome now retired because of the geometry and because of the experiences of other owners, the domes of Baader-Planetarium remained, which I could have a look at during a visit directly in the production in Mammendorf.

Two variants, the 2.3-meter "AllSky dome" with two opening half-shells each and the classic 2.6-meter diameter split dome were available for my needs. For me, only the slit model came into question, because it can effectively reduce the direct irradiation by street lights that was predominant in my case. Baader builds on an existing foundation turnkey – for three times the price of my previous composting plant. I simply didn't want to imagine spending so much money on a telescopic garage. That would be a masI'm going to have to tear a serious black hole in my budget.

A guided tour of Baader's production with explanations by the employee and developer of this dome and a close look at the detailed solutions put the supposedly high price into perspective. I looked at a system whose design finesse reflects the result of decades of experience in professional observatory construction. Although, seen from a distance, the models of the competitors look similar and according to the data supposedly offer the same functions, it would still be unfair to compare them. Their dimensions alone are completely unsuitable for larger equipment.

The purchase decision

I opted for the 2.6 meter dome, which just received a newly developed drive without sliding contacts. In November 2013 I was able to see the almost finished construction at Baader Planterarium in advance. I was told that the observatories were already completely assembled and tested in production before they were installed at the customer's site. This is the only way to ensure that all components function perfectly. On site "only" has to be adjusted.



Preliminary inspection of the dome for testing in the Production of Baader Planetarium / November 2013

The structure

In June 2014, in consultation with and after a drawing by Baader-Planetarium, two interlocking foundations were laid in my garden for the column and the Observatory cast. Even in this early construction phase, clear specifications were made in order to guarantee the best possible protection of the valuable instruments from moisture later on. Three qualified employees needed one and a half days for the actual

Installation in June/July 2014: (1) double foundation for observatory and column; (2) installation of dome ring

(3) Completion of base and dome; (4) Finishing of the assembly work with built-in instruments

assembly and functional test. The complete electronics and control system was already – as mentioned – completely configured and attached to the individual elements. The assembly team also mounted the heavy column ordered on the intended foundation, which would later house the large mount and almost 100 kg of instruments should carry your weight.

In own contribution and again according to Baader, a floor insulation and a wooden floor were installed and the electrics were professionally connected to the grid. After the new mount and telescopes had been installed at the end of July 2014 and a base had been installed around the column to accommodate various power supplies, the tests of the entire system could begin and the observatory in its entirety and function could also be assessed.

The optical impression

At first glance you can see that all assembled GRP parts fit together perfectly. The joints, which are exposed to the weather and sealed with silicone, are again covered with blinds, which prevents spores and moss from infesting them. All screwed on metal parts have corresponding recesses in the form, are countersunk, properly lacquered or anodized or consist of stainless steel. This is the result of years of experience with well thought-out details. The shapes of the outer components are chosen in such a way that water is always kept away from the observatory.is being led.

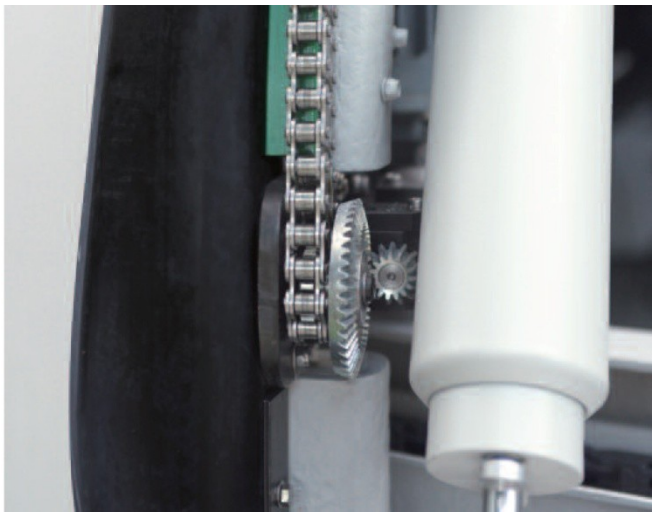
Perfection in detail: the craftsmanship of the design is evident on closer inspection

Joints and gaps which are due to the design of the movable elements are all closed by elaborate rubber seals. Fans up to the cable loops for the gap drive are concealed behind handle protection panels, which prevent fingers and clothing from getting caught when the dome is turned. It is surprising that the sprockets of the competitor models, which are exposed like circular saws, have never been criticized.

A tidy impression: electrical installations in the dome

Temperature and humidity

For me, after the experience with the old dome, these aspects are very important. In the new observatory more and higher quality instruments were used. The observatories of Baader Planetarium are the only ones of the models I have tested and examined that have a double-walled, insulated construction in connection with the already mentioned complete sealing. This prevents, besides the infrared reflective coating of the outer surface, that the interior of the model has a large is subject to temperature fluctuations. The instruments so do not heat extremely during the day and cool at night a lot faster than before. During a measurement At the end of July 2014, with full solar irradiation and an outside temperature of 28ºC, the temperature of the Indoors from 16ºC in the morning to only 20ºC max. the same.



A sophisticated sealing system (on the left in the image) protects the elaborate mechanics and the instruments in the dome

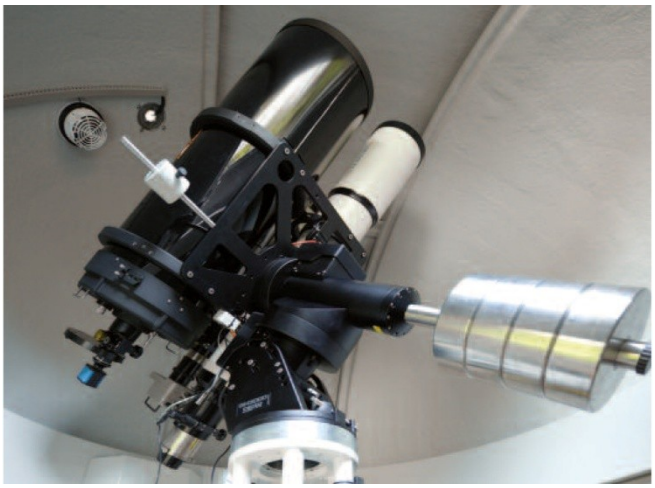
What is remarkable about the overall construction is how little moisture penetrates into the dome, or how little moisture is caused by condensation. In comparison, my old dome was a real fast composter for the telescopes. The Baader construction has also been designed for more extreme climatic conditions than my Central European garden.

On a rainy day in mid-August 2014, the humidity outside rose from 77% to over 95% from late afternoon to the next morning. The humidity meter in the observatory showed an increase from 69% by only 5% to 74% during the same period. In any case, a

dehumidifier will be operated in the observatory in the future to protect the expensive instruments from moisture.the air content as low as possible. For this dome is also possible, because I only Keep the interior dry – not the surroundings. I can be curious about the difference in the electricity bill.

The impression of space

Compared to my old protection structure, the new Baader observatory has only 50 cm more diameter, but now a twice as large mount with four refractors and one SC telescope. The largest refractor has a length of 1.3 m, the SC-telescope has a 14" opening. Due to the height of the observatory of 3.2 m, the new, large mount and the telescopes could be placed on a 145 cm high column, so that the available space for moving the space can be regarded as quite generous. Even though my observatory is mostly considered as a lonely remote photo system is controlled from the house, we were able to relax without any problems. visual observation. The slit has an inner width of 90 cm, sufficient for telescopes with very large opening or, as in my case, for five at a time. mounted telescopes. The length of the gap guarantees an observation from the horizon to the zenith, without any shadowing.



Five telescopes on a large 10 micron mount: nevertheless, there is enough space in the 2.5m observatory

The functions of the coupling control

The functions of the coupling and gap drive can be controlled directly via the Baader ASCOM interface. All known programs are thus available to the user. The true genius of the system remains hidden. Baader Planetarium has developed a control system that allows the dome and 10Micron mount to communicate directly with each other. The dome and mounting parameters (diameter, height of the mount, offset of the column, position of the telescope) are entered into the control unit of the mount via the hand box. When the mounting is started, the automatically to the dome gap selected by me. Telescope. Then the telescope is also controlled manually via the (or the virtual handbox on the computer) the The slit flap and the dome slit are open. If the Mounting moved to the parking position, closing Gap and flap automatically.

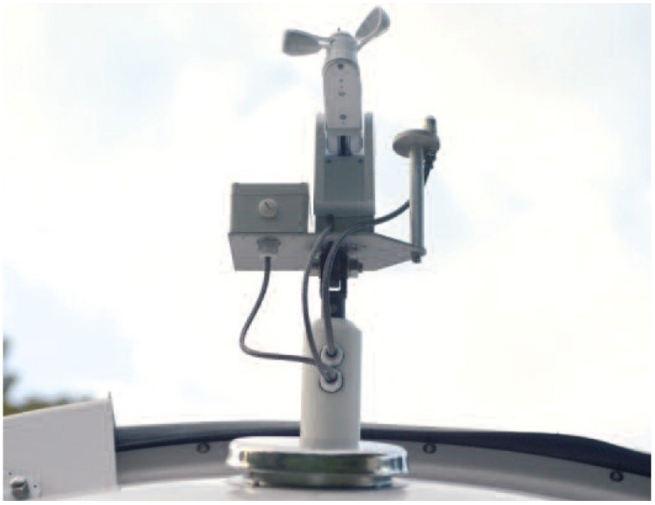
View through the door from outside: the wooden base around the heavy column takes power supply units and the extensive cabling of the instruments, eyepieces and cameras.

All dome parameters are recorded by the hand box. The whole control is carried out by the clearly arranged menu.

As already mentioned – the unique feature of the combination of mounting and dome is that the synchronized operation of the dome drive without external PC works. A big advantage if you want to observe visually fast and uncomplicated. A detour via an ASCOM interface and computer programs is superfluous – whether in visual or photographic operation. Since I already have the best experience

with 10Micron mountings in my stalactite cave and on the move, I am able to offer you the best solution was also able to be collected in the new Observatory a model of this manufacturer built to to also be able to use this invaluable advantage. The PC, which I have in my house and not in the observatory controls exclusively the cameras, guider and motorized focuser.

As already mentioned, the newly developed coupling control functions without dirt-prone and costly intensive sliding contacts. This also means that the dome gap can only rotate 200 degrees in both directions. If the mounting rotates, the dome also follows with an almost full rotation. This works perfectly, almost silently and at an incredible speed. Here you should take care that no person is standing close to the observatory, because the almost horizontal slit flap (when it is fully open) shoots past exactly at head height. Only my partner with an overall height of 1.62 m has nothing to fear. The wonderfully quiet gate movement and rotation is for me an enormous mental relief – no more protests coming from the neighborhood.



The sensors on the dome give the signal to close the dome gap in case of rain, snow, wind and clouds

Additional spring sensors are mounted on the dome. They monitor wind speed, clouds, Scheeflocken and rain drip and close, depending on set parameters, automatically dome gap and flap. The emergency program is activated even if the PC and the observatory electronics are separated for more than 10 minutes, thus effectively protecting my valuable instrument atrium. All this is for a remote operation is absolutely necessary, but also if the system is working through a recording plan in the garden and you are not able to get through a I'll let you distract me with a bottle of good wine.

The drive unit for dome gap and dome flap: in case of a total Power failure, manual closing is also possible.

At very high humidity, a fan motor starts up near the dome and begins to extract the humid air. An air inlet with a dust filter is mounted near the floor in the base cylinder, which is also insulated, in order to prevent a vacuum inside and thus enable the door to be opened.

Facit

Over two years I had thought about buying an observatory from Baader Planetarium. The supposedly high price had deterred me and led me to buy a much cheaper model. That this was a mistake and ultimately drove the budget even higher, could have been I understand only after many (futile) attempts at reworking the "old" model. I invested several months and a lot of money to get to the bottom of the problems and to find a remedy. It was of little use, because I could only try to eliminate the consequences of the faulty construction. Here too, as in almost all areas of amateur astronomy, the following applies: Those who can and want to afford the quality acquire a mature product with the Baader observatory, which works unproblematically in the background and effectively protects the expensive instruments from all weather conditions.

Kai v. Schauroth in September 2014