

## astrofactum: The first Public Space Telescope



In September 2013 the Munich based start-up company astrofactum, Institute for Astronomy and Space Technology, presented its project 'Public Telescope', the first public space telescope 'Made in Germany'.

The main objective of the project is to provide astronomical observations for a wide international community, not just for the select few participating in official astronomical projects: everyone can access data from the Public Telescope using the internet - amateur astronomers, educational institutions and scientists as well as the interested layman.

The space telescope is currently being developed in Germany and is planned to be operational within the next 4 years. Once the telescope is deployed in earth orbit, it will be accessible by everybody - worldwide.

### Opportunities

Users will be able to take photographs of objects such as planets, stars or galaxies via a simple and easy to use internet portal accessible also via mobile devices and/or tablets with an app.

The high resolution of the telescope offers new possibilities for the observation of small or distant objects.

It will be possible among others to study the evolution of the planets and their moons in our solar system very accurately or to analyze the distribution of meteorite impacts on Jupiter and Saturn in great detail.

In addition to these classical observations, unresolved questions like whether asteroids orbit the sun within the orbit of the planet Mercury can be answered.

The space telescope project will offer an extensive and fully customizable suite of functions and configurations for amateur astronomers; co-ordinates can be directly input, different cameras selected, exposure time, color filters and much more can be set individually.

The educational aspect of the Public Telescope is emphasized by providing students with the opportunity to access state-of-the-art space technology for their own projects. Planets, galactic nebulae, galaxies, detailed sections of the earth or the moon - all of this can be observed and discussed in real-time while attending lectures.

More value to current science and research activities will be added with tools for monitoring the ultraviolet light, thus providing an excellent complement to existing monitoring capacities for scientists.

### Technology

The space telescope will be equipped with an optically effective mirror with a diameter of 80 cm. Due to advanced technology, the angular resolution will be in the visual spectrum of the theoretical limit of 0.15 arc-seconds. Instruments for different spectral ranges, such as infrared (IR), visual (VIS) and ultraviolet (UV) will also be included allowing the recording of images, spectroscopy and photometry.

### astrofactum GmbH - Institute for Astronomy and Space Technology

astrofactum GmbH was founded in March 2014 by the initiator of the space telescope project Heiko Wilkens (49) and by Christian Alexander Wiederer (42). The company aims at long-term positioning in the marketing of astronomical observation services as well as other satellite based services for scientific and ambitious private users.

SpaceOps News had the opportunity to pose some more detailed conceptual and technical questions to Messrs Heiko Wilkens and Christian Wiederer of astrofactum ([Public Telescope](#)):

#### What are your budgetary/financial options for securing the realization of the Public Telescope project?

astrofactum: The Public Telescope is currently financed by private funds. The conceptual design is completed and the business plan is available. There will be a two-phased implementation approach: in the first phase the detailed concept will be elaborated i.e., the definition of all planning documents for the space segment as well as the definition of the software architecture for the utilization and control of the telescope will be finalized. In the second phase the construction of the satellite, the implementation and testing of all software components as well as the launch of the space telescope will be accomplished. After that the operational phase and the generation of revenue will begin.

The strategy to finance the project is to find a prime private investor who will provide the financial backing for the two implementation phases. In addition to attracting private investors, we strive for accompanying support e.g., to receive separate funding for the conceptual phase.

We are also working on a second funding strategy that assumes a greater institutional involvement in the utilization of the first satellite. However, the implementation of the software as well as the implementation and operations of follow-on telescope satellites would remain under the full responsibility of the private sector.

This concept accounts for the expected strong interest of scientific users which could use a high fraction of the capacity of the first

satellite for their purposes. In the case of a predominantly institutional demand, public funding support – in whatever form – should be considered.

### **Depending on the (earth-) orbit of the Telescope - what are your launch options and possibilities?**

astrofactum: We assume operating the space telescope in Low Earth Orbit (LEO), between 500 and 700 km. We are looking for a piggyback launch. We are exploring several launch options and we also look very closely into launch capacities of new start-up providers. Overall, however, it is still too early to provide any details, we still must finalize what kind of satellite bus we want to use.

### **Since you are announcing Earth observation opportunities as well – what will be the instrumentation and orientation/pointing mechanisms?**

astrofactum: Our main focus is on astronomical observations with the telescope. However, for interested customers, we also want to provide the capability to stream overview images of the earth in similar quality and resolution as we know from ISS services.

### **How will the real-time data distribution to the end-users be facilitated and how will possible planning/priority conflicts for data-takes be resolved?**

astrofactum: Observation requests will be entered via an online portal. It will also be used for observational data presentation. Depending on the user group and payment model a basic observation cycle priority will be established. Based on the observation requests and boundary conditions an algorithm will determine the observation sequence to be executed by the telescope. An important optimization goal will be to minimize repositioning and re-configuration periods of the telescope during one observation cycle.

### **What is your operations concept (centralized, decentralized or outsourced)?**

astrofactum: The operations concept is currently analyzed as part of the overall mission design process. Several factors will play an important role and still are under discussion. These include on-board data generation and storage capacity, degree of platform autonomy, the selection of the final orbit as well as the user requirements with respect to data access. Currently a centralized operations concept is base lined, whether operations could be outsourced will be decided at a later stage.

### **What is the planned Public Telescope's lifetime?**

astrofactum: The first satellite is designed for an operational life time of about 5 years. During the third year of operation we plan to bring a second satellite into operation because we want to grow through the extension of our observation capacity expecting the first satellite to be at its capacity limit at that time.

However, if we could implement the project according to the second financing strategy mentioned above, i.e., with greater public interest, the planned operational lifetime of the first satellite could possibly be shorter.

### **What will be the economic baseline for providing the data services to your customers (fees, donations, membership, subscriptions)?**

astrofactum: This depends on the funding model of the project. In a purely privately funded model all users i.e., scientists as well as amateur astronomers or educational institutions would pay the same fee for their individual observation times via hosting accounts or via pay-per-use. In a PPP (Public-Private-Partnership) model specific quotas for public users will be assigned without a fee, commercial applications will be marketed.

**SpaceOps News** wants to thank you for the frankness in answering our detailed conceptual questions. We will be very interesting in monitoring your progress and wish you good luck for this ambitious enterprise.

*July 2014, Joachim J. Kehr, Editor SpaceOps News*