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Engineering Fellows at ESO

ESO's core mission is to build and operate state-of-the-art facilities for the advancement of astronomical research and to foster international cooperation for astronomy. A strong research and development programme is therefore at the core of ESO's activities. For this reason, for a few years ESO has established, in addition to the ESO fellowship programme for researchers in astronomy, an engineering fellowship programme. The profile of one of these ESO engineering fellows is presented here.

Petr Janout

A person close to me once asked what I thought about the Universe. I could have said that it's something bigger than all of us and then asked a rhetorical question about how our own problems relate to the Universe at large. But my reply was that the Universe is something that keeps us focused throughout our lives because it is an endless well of knowledge. That question, however, still comes to my mind from time to time.

My choice of field of study led me to the Czech Technical University in Prague, where I started along the path of becoming an electronic engineer. During my studies, however, I began to move more and more into the field of optics and photonics. Light, lasers, and photons brought another dimension to the electrical field, as it was possible to see what light does in different materials and how it interacts, and how light is perceived by human beings. Therefore, when finishing my engineering studies, I decided to get involved more deeply in optics and photonics and so I decided to join a photonics research group.

From the beginning of my PhD work, I focused mainly on the deformation of the wavefront of extremely wide-field-of-view imaging systems. The main question was whether we could mathematically describe all-sky monitors well enough to retrieve useful astronomical data and use an all-sky camera to observe and forecast upcoming natural disasters in the form of torrential rains or other observable meteorological events. In parallel, our group has worked on interesting topics involving crystalline materials that can be used for light- and acoustic-wave interactions. This research sparked my curiosity about what we can do with photons. As soon as the opportunity to join ESO occurred, I was especially interested to start working on larger-scale optics and to begin looking deeper into the Universe.

The opportunity to join ESO came from the Czech Ministry of Education, Youth and Sports through a dedicated training programme for Czech students and interns at ESO. I got involved in finding solutions to the issues affecting large-scale and complex optics as regards the alignment of segmented mirrors during and after the maintenance of a segment. I also explored the potential of spatial light modulators in the application of large-scale optics. This initial period at ESO drove me to the decision to apply for an ESO Engineering Fellowship and continue the exciting work I'd found myself doing. I was driven by an interest in exploring and expanding my awareness of the applications of spatial light modulators. With a bit of creativity, they can be used in many ways where the phase of the modulated light becomes an important consideration. This, however, is only a small part of my ongoing work at ESO.

At ESO I am also involved with the CaNaPy project, which is a pioneering laser guide star (LGS) adaptive optics (AO) facility to experimentally explore novel schemes for visible-light AO corrections. I am involved in the optomechanical design, the alignment, and the testing of the optics used at the CaNaPy facility. When the CaNaPy bench is installed at the OGS telescope in Tenerife, we will use it to explore and demonstrate optimal LGS-AO performance at visible wavelengths and in harsh seeing conditions. This will include operating the LGS AO during the much harder daytime conditions and attempting the retrieval of atmospheric tip-tilt from the LGS beacon itself.

Working on amazing projects is of course simply a part of everyday life. When the time comes to leave a city, I like to be lost in nature and enjoy the beauty and silence of the mountains. A camera is then my favourite toy to capture the memories of the moment.