

17 Mechanical Workshop

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Infrastructure

In the past year the student workshop was rearranged, the modifications included dismantling of the soldering room and the relocation of small drilling machines and workbenches. In future, soldering work can be carried out in the locksmithery. A new wall crane (Fig. 17.1) was installed which will be used to handle heavy workpieces. Furthermore, in order to create more space in the main workshop the big lathe will be moved to the student workshop. Finally, the outdated scale in the material storage room was replaced to ensure precise weight measurement of the materials for customers.



FIG. 17.1 – Installation of the wall crane in the student workshop.

To promote the exchange with many of our customers from various institutes of UZH, ETH Zurich, universities of applied sciences, as well as the customers of the material storage, our annual aperitif was organized in autumn.

Personnel

In Autumn 2016 we already signed the apprenticeship agreement with Noah Regensburger who will start the four-year apprenticeship as a polytechnic EFZ in August in our workshop. Marcel Schaffner celebrated his 15th anniversary in our team. Congratulations again! Our two apprentices in their final year are presently in the examination period. Brandon Markwalder has already completed the practical exam (Fig 17.2) while Pascal Weyeneth will start soon. We wish both all the best and good luck!

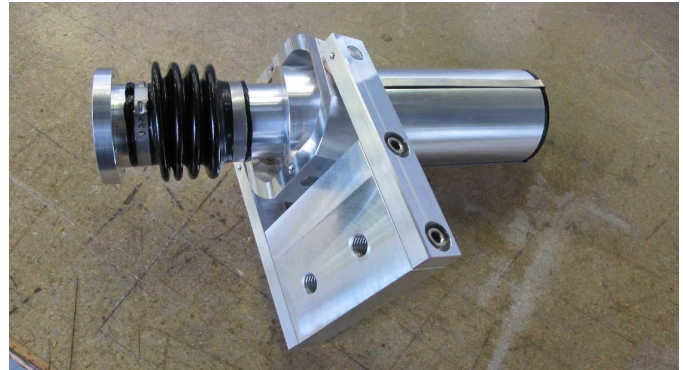


FIG. 17.2 – Mirror actuator for CTA.

Teaching

As every year, our annual workshop courses for bachelor students, which took place in August/September 2016 and January/February 2017 were received with great enthusiasm (Fig. 17.3). In Autumn 2016 ETHZ apprentices trained their welding skills in our workshop. Finally, we held a workshop course for PhD students in physics with a focus on learning the basics of mechanical manufacturing as well as technical drawing.

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FIG. 17.3 – Students in the workshop course are being instructed by Reto Maier.

Projects

Last year, our workshop was busy producing very complex parts for the large projects CTA (Sec. 6) and CMS (Sec. 10). Besides that we were involved in various internal and external projects. In the following some projects are listed to which we significantly contributed:

- CTA Cherenkov Telescope Array (Sec. 6)
In the previous year the prototype camera was put together and shipped to DESY Zeuthen in Berlin. This year the mechanical components for two additional cameras have been manufactured.
- CMS Barrel Pixel detector upgrade (Sec. 10)
Many milling- and turned parts including the large cover hood were produced for the supply tube of the CMS pixel detector.
- Surface Physics (Sec. 14)
During roughly one month the group studied the excitation of molecular vibrations with the help of THz pulses at the Free-Electron Laser FLASH at DESY in Hamburg. The experiments were performed by means of photoelectron diffraction using WAL-küre, a mobile electron spectrometer. The necessary modifications, in particular the holder of a special parabolic mirror for focusing the THz radiation onto the sample, were made in the workshop. In addition we completed another production series made from the not easily machinable material molybdenum.
- IPHO2016, International Physics Olympiad
The workshop team was responsible for preparing the exam halls and the installation and dismantling of the exam desks for the 400 students in the training halls of the ASVZ (Fig.17.5).

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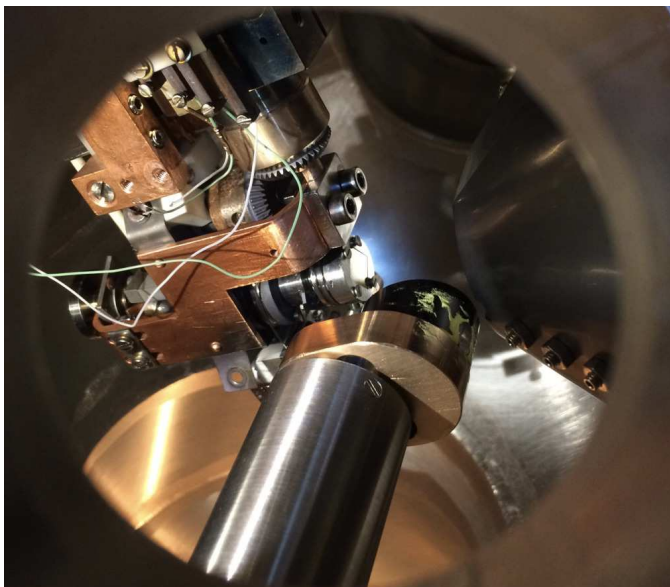


FIG. 17.4 – Fixation for a parabolic mirror.

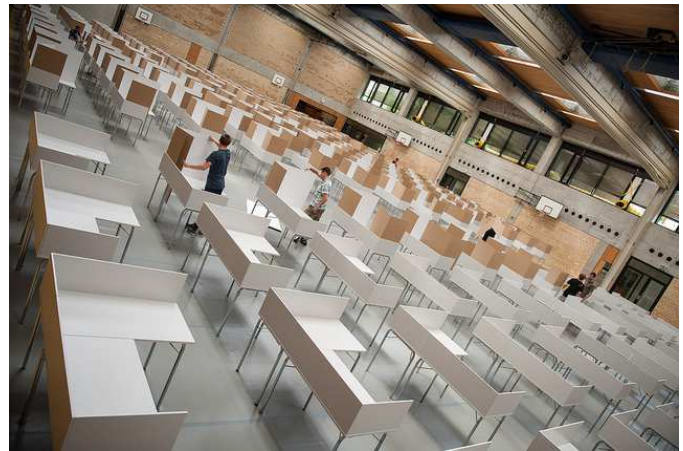


FIG. 17.5 – Preparing the examination hall for the physics olympiad.

- Astroparticle Physics (Sec. 4)
We designed and constructed a screening cell for the GATOR facility (a low-background germanium spectrometer) at the Gran Sasso underground laboratory (Fig.17.6). Currently this demanding project is being completed. The parts will be assembled in the next weeks at the Gran Sasso laboratory.

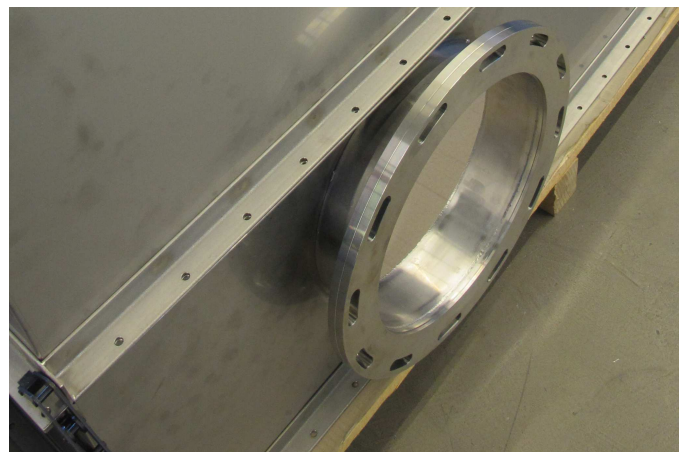
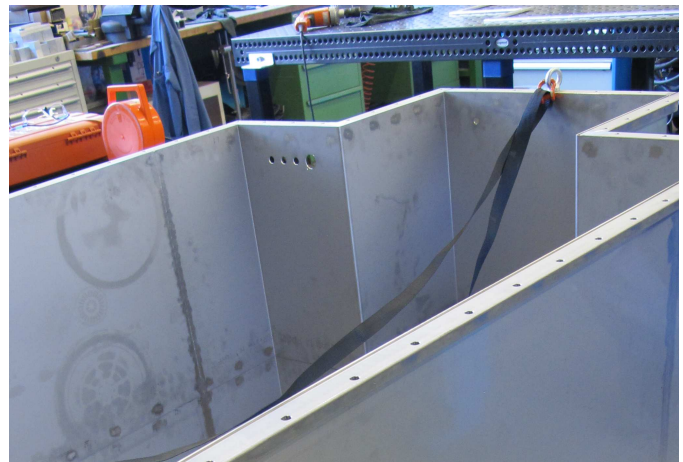


FIG. 17.6 – Screening cell for the GATOR facility.

- Disordered and Biological Soft Matter (Sec. 16)

An integrated swimming channel (Fig. 17.7) was developed and built for the determination of three-dimensional speed profiles of the water around a swimming zebra fish. It includes two recirculation basins and an adjustable mirror support for the laser camera. Additionally, a robust metal rack was designed to accommodate the laser together with the electronics and the cooling system.

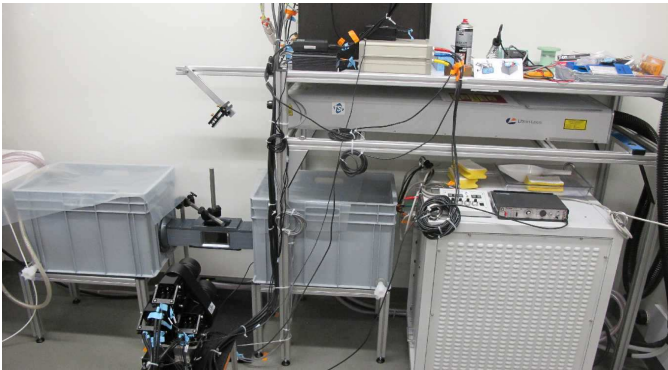


FIG. 17.7 – Top: Full setup, in the centre the fish channel with the laser camera is visible. Middle: Laser camera system. Bottom: Protective housing.

Specially manufactured spring-steel was used to fix the electronic sensors that are used to determine the mechanical properties of the fins of the zebra fish. Furthermore, a new protective housing (Fig. 17.7 bottom) for the integrated setup of the measurement, which

was also developed and built in the workshop, was constructed. This is needed to avoid turbulences from the ambient air during the measurement.

- Phase transitions, materials and applications (Sec. 13)
As in previous years, several sample holders to be used inside a cryostat were produced.

- Demonstration experiments for the lectures
In order to guarantee excellent demonstration experiments for the student lectures we designed and produced some new devices and revised and maintained several older parts, an example is shown in Fig. 17.8.



FIG. 17.8 – Vacuum cannon.

- External orders
 Thanks to our highly motivated and competent workshop team many orders were placed from external institutions, universities and private

companies (Fig. 17.9). This shows that our workshop is well known for its competence and high quality work even outside of our institute.



FIG. 17.9 – A selection of parts produced for external institutions, universities and private companies.