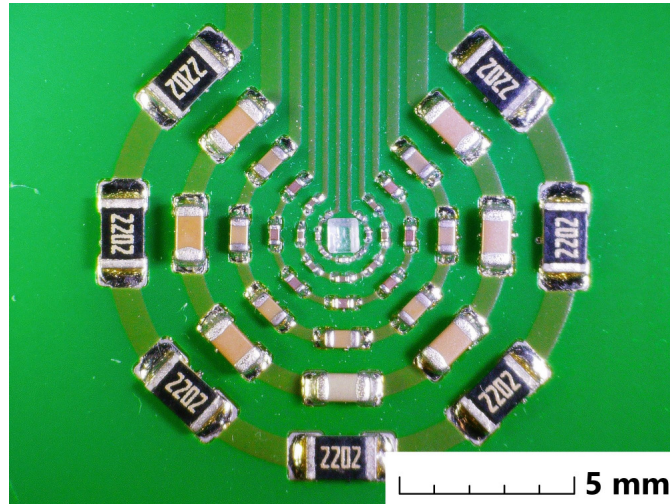


Workshops



Solder-Challenge Board with a sugar crystal in the center (0.9 x 1.0 mm).

Mechanical Workshop

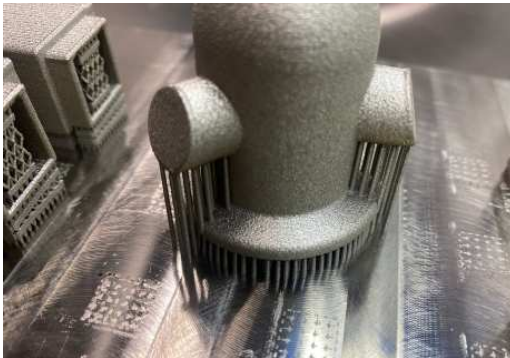
The **mechanical workshop** produces complex parts for all the experiments in house as well as for the large-scale astrophysics and particle physics experiments our groups are contributing to and helps to find solutions for techni-

cal problems. In the last year, the workshop has expanded its expertise to include additive manufacturing of metals (3d printing) which allows to produce highly complex geometries.

<https://werkstatt.physik.uzh.ch>



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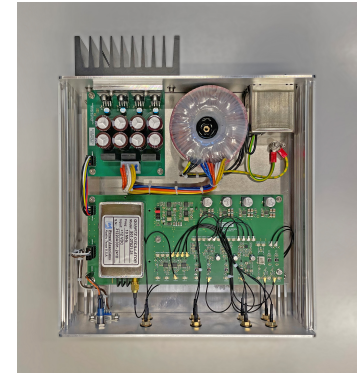
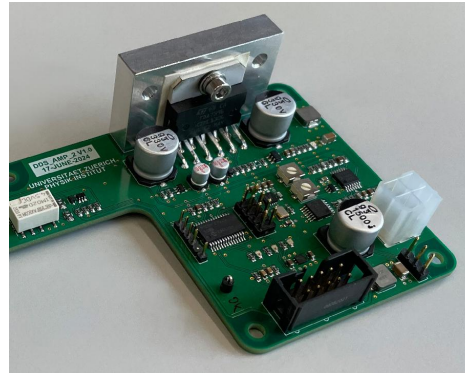
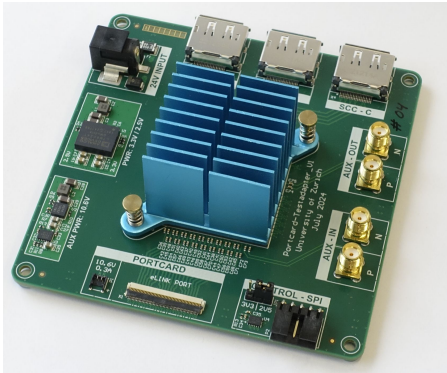


The three photographs are examples for objects produced with 3d printing: (left) small, helium-tight vacuum chamber with a wall thickness of 0.4 mm; (middle) heat exchanger made from stainless steel; (right) puzzles for the open day.

Electronics Workshop

Besides maintenance work for the existing laboratory infrastructure the **electronics workshop** continuously supports the groups of our institute with technical advice, prototypes and new developments for ongoing projects. Apart from many ongoing and newly developed projects

for the research groups of our institute we designed a 10 MHz reference oscillator with emphasis on ultra high signal fidelity. The oscillator is built without any digital components or switched mode supplies and features an integrated oven to thermally stabilize the oscillator crystal.



Left: Portcard-Testadapter for CMS to test 42 data channels. Middle: Function generator based on the Digital Direct Synthesis principle, for the teaching material collection. Right: Ultra low-noise 10 MHz reference oscillator with phase stability $<100\text{fs}$.

