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Tabletop and High-End Beamlines: Friends or Foes?

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The impressive brightness progress of short wavelength light sources, of about 30 orders of magnitude since the early days of W.C. Röntgen, has been characterized by the drastic upscaling of the footprint and engineering complexity. Large-scale facilities are the high-end short-wavelength sources, whose operation requires a large technical and scientific skill. These are accessed on a user beamtime mode.

In parallel, a few groups still have worked on the improvement of compact “tabletop” sources. Essentially two tabletop architectures have established, based on either a parametric or non-parametric process. While the two concepts are complementary, their combination offers a large range of capabilities on a tabletop. As of now, the operation is concentrated in the VUV or soft X-rays. Therefore, the fair comparison is with high-end beamlines such as FLASH2@DESY or future ARIA@Sparc (2029) offering user access to this interesting range of radiation.

Originally, discovered by Viktor Schumann a couple of years before Röntgen’s milestone report on X-rays, the “Schumann range” remained underexploited due to the superb capabilities of X-rays. Nevertheless, quite unique experiments in chemistry, materials and so forth are possible in this spectral range. Still the lack of 24/7 access was blamed as a main cause to its stagnation. It will be however shown that the real bottleneck factor in the popularity of high-end sources is not the discontinuous access. Recently, a VUV revival is ongoing in (photo)chemistry, which sharpened an underlying competition between high-end beamlines and tabletop counterparts. A bird’s eye view is presented to highlight complementarities as well as contrapositions. We will conclude with a proposal for the strengthening of the VUV community, indicating the specifications for an open discussion with the audience.

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