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What is needed to build a CLS based research infrastructure like STAR and what are the enabled applications towards users

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In this presentation I will describe the resources (funding and human) requested by the construction of a research infrastructure based on an Inverse Compton Scattering source like STAR, under commissioning in Calabria (South Italy) and the technological challenges that must be addressed to develop and maintain such a research infrastructure. ICS sources have a great advantage in their capability to generate advanced X-ray beams in the hard-Xray energy range (100-500 keV) with relatively compact machines, whose cost is in the range O(10 M$), an order of magnitude smaller than a typical synchrotron light source. Advanced X-ray imaging using micro-tomography of thick metallic objects as typical of archeological artefacts can be successfully carried out with ICS like STAR thanks to the tunability, mono-chromaticity, polarisation, collimation and time structure (short pulses) of the generated X-ray beams, together with possible dual-color option for K-edge subtraction imaging. STAR is equipped with two beam lines to cover all possible X-ray spectrum of interest. A low energy beam line generating photon beams in the 20-100 keV energy range, and a high energy beamline serving applications in the 80-350 keV range. STAR has been completely assembled and partially tested so far, and is waiting for the radio-protection authorisation to start beam operation, that is expect to happen by the end of 2023.

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