Contribution ID: **61** Type: **Invited Talk**

Developing an African Inverse Compton Scattering source of advanced X-rays as an incubator on the path towards the African Light Source

Monday, 25 September 2023 14:30 (25 minutes)

Inverse Compton Scattering sources are becoming world-wide user facilities delivering advanced X-ray beams to applications in the medical, cultural heritage, material studies and nuclear photonics / photo-nuclear physics fields. ICS delivering up to 300 keV X-rays are compact, cheaper and easier to operate that large scale storage-ring based light sources. Although the performances of ICS in terms of fluxes and brilliances are definitely lower than synchrotron light sources, at least for photon energies below 150 keV, these machines can be located and operated inside University Campus, and their cost is limited in the range 10-20 M$ (depending on the maximum X-ray energy required). Nevertheless, designing, building and putting a ICS into operation (with electron beam energies in the 50-200 MeV range) implies the development of an accelerator team acquiring expertise in several involved key technologies, like RF, electronics, lasers, vacuum, diagnostics, control systems, alignment, beam-lines, X-ray detectors, radio-protection, ancillary equipments, beam dynamics/simulations, that are also fundamental for any large scale accelerator like GeV-class electron storage rings. Therefore, developing a ICS source inside an African University Campus (or equivalent laboratory) can be the first step towards the ambitious goal of building the African Light Source (AfLS). This small scale first step, in principle sustainable by a single African country, can be the incubator facilitating a build-up of a pan-African endeavour towards the AfLS.

Abstract Category

Accelerators

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Session Classification: Accelerators & Light Sources

Track Classification: Physics Research