African Countries Joining Large Collaborations Electron Ion Collider and sPHENIX Research

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Particle and high energy physics has been a fascinating research field in which scientists globally have been making combined efforts to understand the building blocks of matter and the force that binds them together. The study requires diverse and skilled manpower at various academic levels such as undergraduate, graduate, postgraduate, and faculty levels. In addition, mathematical, physics, computational, and engineering skills with knowledge are equally required. To meet this demand successfully, scientists globally work together in large collaborations such as the ATLAS Collaboration at the European Organization for Nuclear Research (CERN) in Switzerland and the PHENIX Collaboration at the Relativistic Heavy Ion Collider (RHIC) in the United States. However, at present, few African countries such as South Africa, Morocco, Egypt, Senegal, Zambia, etc, are making contributions to these types of research collaborations. This talk is, therefore, aimed at encouraging several African research institutions and universities to develop interest in this research, and to discuss research contributions the University of Zambia is making in the PHENIX Collaboration using the PHENIX detector at RHIC and Electron Ion Collider (EIC) research prospects including some of the challenges. PHENIX is an exploratory experiment designed for investigating high energy collisions of heavy ions and protons whose primary goal is to discover and study a new state of matter called the quark-gluon plasma (QGP) that in turn allows us to better understand the early universe. The PHENIX detector is decommissioned and is replaced by sPHENIX following some upgrades. The EIC, on the other hand, will be a discovery machine to be used to unlock the secrets of the force binding the building blocks of visible matter in the universe. The EIC will comprise two intersecting accelerators for producing intense beams of electrons and protons or heavier atomic nuclei that will be steered into head-on collisions at high energies in the order of giga electron volt (GeV). The benefits include scientific discoveries in a new frontier of fundamental physics and triggering technological breakthroughs on the human health plus other global challenges.