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Plans for future energy frontier accelerators to drive particle physics discovery

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The ongoing U.S. Particle Physics Community Planning Exercise, “Snowmass 2021”, which is organized around discussions spanning ten scientific frontiers, will soon come to an end. This process will provide a scientific vision document for the future of the U.S. high energy physics (HEP) program and aims to define the most important questions for the field as well as to identify promising roadmaps to address them. After the Snowmass process concludes, the Particle Physics Project Prioritisation Panel (P5) will develop a 10-year plan for US particle physics to address the most compelling scientific opportunities.

Accelerators able to collide high energy and high intensity particle beams are the most promising tools to understand and measure the heaviest particles of the Standard Model (SM). They also enable exploration of the physics beyond the SM to discover new particles and interactions, including unraveling the mystery of dark matter. For the past 50 years Particle Colliders have been at the forefront of scientific discoveries in HEP.

Several multi-TeV collider concepts were considered during this two-year process. A range of issues were discussed, including: the physics reach, the level of maturity of the facility concepts, the potential machine routes, timelines, R&D requirements, and common issues for these very high energy machines such as energy efficiency and cost. We will discuss and compare these concepts on the basis of their physics potential. This includes various possible future accelerator scenarios, such as lepton-lepton, hadron-hadron, and lepton-hadron colliders. Synergies between the facilities and the technology R&D required to validate the designs will be addressed along with the potential timelines to deliver next-generation colliders that can operate in the 1-100 TeV center-of-mass energy range (or beyond). The aim is to explore possible strategies towards a next generation multi-TeV collider to play a crucial role in future discoveries at the energy frontier.

In-person participation

Yes

Primary authors: VALISHEV, Alexander (Fermilab); PALMER, Mark (Brookhaven National Laboratory); Dr PASTRONE, Nadia (Istituto Nazionale di Fisica Nucleare); Dr TANG, Jingyu (Institute of High Energy Physics); Dr TURNER, Marlene (Lawrence Berkeley National Laboratory)

Presenter: Dr PASTRONE, Nadia (Istituto Nazionale di Fisica Nucleare)

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