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AZIMUTH: a new generation telescope array for EoS experiments

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The nuclear Equation of State (EoS) community is converging towards experiments with exotic in-line fragmentation beams, at energies above 100 MeV/u. Many groups are now interested in the recently upgraded FRIB facility, at the Michigan State University (USA). In the beam energy region there available, the study of dense nuclear matter at supra-saturation density is possible and it allows to constrain the symmetry energy behavior. The INFN NUCL_EX collaboration, together with many other groups, presented a letter of intents to the FRIB PAC, collecting many physics cases and suggesting new detector setups for measuring them.
In this context, I am going to submit an application for an ERC Consolidator Grant, proposing a new generation telescope array. The project, called AZIMUTH (A and Z Identification, Modular, Universal, Tracking Hodoscope), will focus on a Si-Si-CsI module, combining two SSSSD layers for a precise position determination, followed by CsI cubes. The aforementioned modules may be stacked one after the other, enabling tracking capabilities of most energetic particles punching through the various CsI layers. By means of machine learning we plan to classify the possible paths of light charged particles (H and He isotopes) in the CsI layers in order to identify also the ions which scatter or make a nuclear reaction inside the crystals. In such a way we should maximize the detection efficiency of the telescope. Thanks to the first two solid state layers we should be able to discriminate in charge and mass also the least energetic intermediate mass fragments, making the apparatus almost "universal". Finally, we propose a streaming readout paradigm to reduce the amount of electronics needed to operate the detector.
In this contribution I'd like to illustrate the submitted project and other possible alternatives which can be used to study the EoS at FRIB and in future European laboratories (FAIR, FRAISE, Spiral2, etc...).

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