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Micro-vertex detection system for the WASA-FRS HypHI Experiments at GSI-FAIR

The determination of the baryon-baryon interaction is crucial to build models on nuclear systems. Nowadays, nuclear spectroscopy provides insights into the nucleon-nucleon force, enabling effective modeling of the majority of measured isotopes. Notwithstanding, the scarcity of nucleon-hyperon or hyperon-hyperon interaction studies leads to poor prediction power when modeling nuclear systems that include strangeness, such as neutron stars. The hypernucleus, a bound system containing nucleons and at least one hyperon, can be considered as a small laboratory where to study the nucleon-hyperon interaction features.

The WASA-FRS HypHI Collaboration aims to study light hypernuclei by means of heavy-ion induced reactions [1] at GSI-FAIR (Germany), which stand out among other production methods because of the high multiplicity of the primary products. This fact allows for the determination of the primary vertex, which could highly improve the resolution of the lifetime measurement of the hypernucleus. The micro-vertex detection system has been developed with the main purpose of obtaining the event-by-event interaction point of the primary beam (I ~ 10^7 pps) on the target.

The micro-vertex detection system consists of four stations of single-sided micro-strip silicon detectors. The strip size is 80 μm for the first two stations and 160 μm for the latest ones, which are combined by pairs in the same Front-End electronics channel. Preamplifying and shaping of the signal is performed by sixteen ASICs (VATAGP8 from IDEAS). These chips are connected and controlled by three motherboards, also developed by the global manufacturer Alibava Systems.

My contribution to this symposium would consist in the description of the micro-vertex detection system, the presentation of its performance results from the first experimental tests with a low-energy beam accelerator at CMAM (Spain), and the introduction to its experimental purposes in the upcoming WASA-FRS Collaboration Experiments.

[1] T.R. Saito *et al.*, Nature Reviews Physics **3** (2021) 803-813.

Submission declaration

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