EMIS 2022 at RAON



Contribution ID: 69

Type: Poster Session

Development of the STARK detector for nuclear reaction studies

Tuesday, 4 October 2022 19:28 (8 minutes)

Single-nucleon transfer reaction in inverse kinematics with radioactive beams is one of the powerful methods to study nuclear astrophysics, nuclear reaction, and other applications. Since outcoming particles from the transfer reaction carry important nuclear spectroscopic information, an accurate detection system for charged particles is required to measure their energies and angles. A silicon detector array providing a large solid angle coverage with good energy and position resolution has been developed and used for such measurement [1,2]. Silicon Telescope Array for Reaction studies in inverse Kinematics, STARK, is under development at the Center for Exotic Nuclear Studies to perform nuclear reaction experiments including elastic scattering and neutron transfer reaction. The array is composed of 3 rings to cover a large angular range and consists of 40 double-sided, resistive silicon strip detectors and 12 single-sided, non-resistive strip detectors. The expected angle resolution is less than 1°, and the angle coverage is 43~78° and 105~150°. The GET (General Electronics for Time projection chamber project) electronics system is used to handle about 1000 channels from detectors. Several elastic scattering experiments are considered as commissioning of the STARK at the KoBRA in the early stage of RAON. Current status of development and a detailed description of the detector system will be presented.

[1] D.W. Bardayan, S. Ahn et al., Nucl. Inst. Method. A 711, 21,160-165 (2013).

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Session Classification: Poster Session

^[2] C. Aa. Diget et al., JINST 6, P02005 (2011).