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The first nuclear reaction measurements on the CRYRING using the CARME chamber

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Storage rings provide a new and unique opportunity to resolve long standing by performing nuclear reactions using stored heavy ion beams on an ultra-thin internal gas-jet target. The CRYRING storage ring, part of FAIR phase-0, is unique worldwide by allowing ion beams to be decelerated, cooled and circulated at energies of astrophysical interest. The recently installed and commissioned CRYRING Array for Reaction MEasurements (CARME) chamber utilises this novel methodology and will be used to study direct nuclear reactions at energies of astrophysical interest in addition to indirect studies of key nuclear properties with consequences for quiescent and explosive astrophysical environments.

I will present the technical capabilities of the CARME system and results of the first commissioning run. The CARME chamber was mounted on the CRYRING in September 2021. High resolution (30 keV FWHM), highly segmented (128x128 strip) Double-Sided Silicon Strip Detectors (DSSSD) were installed in the chamber and proved that XHV pressures, required for circulation of beam around the ring, could be achieved with detectors and the accompanying electrical cabling installed directly under vacuum with no pockets or windows. The detectors are capable of movement which is required to avoid un-cooled beam in the storage ring.

CARME was successfully commissioned in February 2022. This was the first use of the internal gas target, the first beam on target and first observation of nuclear reactions at the CRYRING and acts as a launch pad for the exciting physics programme ahead.

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