

## Measurement of the astrophysically relevant alpha capture reaction rate $^{44}\text{Ti}(\alpha, p)^{47}\text{V}$

### Motivation

$^{44}\text{Ti}$  ( $t_{1/2} \sim 60$  yrs.) is produced in a core-collapse supernova via the reaction  $^{40}\text{Ca}(\alpha, \gamma)^{44}\text{Ti}$  and consumed via:



Amount of  $^{44}\text{Ti}$  measurable via space-based X-ray telescopes.

Knowledge of reaction rates required to confine SN models to observation.

→ measure rate at CRYRING@ESR

Proposal already submitted at G-PAC 2020: got A-rating (E151)

Due to Covid-19 severe delays in setting up CARME and internal target.

In 2022 beamtime period no He-target available, CARME with 1 detector instead of 4.

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### Beam time request

Requested for beamtime 2023/24:

42 shifts data taking (14 days,  $\sim 6$  events/day with  $10^5$  ions/spill), 15 shifts for setting up

EBIT from HZDR to be installed at local injector of CRYRING@ESR,  $^{44}\text{Ti}^{17+}$  ions inj. at 0.3 MeV/u and acc. to 1.5 MeV/u.

Required instrumentation @ CRYRING@ESR:

- Internal target with He-gas jet ( $10^{12}$  at/cm<sup>2</sup>)
- Full CARME detector array

Radioactive  $^{44}\text{Ti}$  provided by PSI (group of D. Schumann)

Imported into EBIT via MIVOC method (Metal Ions from Volatile Organic Compounds), solid material with high vapor pressure @ room temperature

Beamtime request for 2024: CARME and internal target need to be fully completed and commissioned – very low expected event rate!

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