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Measurement of Thick-Target ¹⁸O(p,n)¹⁸F Neutron Energy Spectrum, Yield and Angular Distribution at E_p =2582 keV Moshe Friedman The Hebrew University of Jerusalem

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Motivation

A neutron source for low-energy s-process measurements

M. Heil (PRC 2005):







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Producing neutrons in Israel

Soreq Applied Research Accelerator Facility (SARAF)



 Table 1. SARAF-II beam top-level requirements.

Parameter	Value	Comment
Ion species	protons/deuterons	$M/q \le 2$
Energy range	$5-40\mathrm{MeV}$ deuterons	variable
	$535\mathrm{MeV}$ protons	energy
Current range	$0.04-5\mathrm{mA}$	CW (and
		pulsed)
Operation	6000 hours/year	
Maintenance	hands-on	low beam loss









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Why repeat measurement?



• Our simulation do not

reproduce Heil's data

• Energy seems a bit off







Measurement at PTB

- A 308 μ g/cm² Ta₂¹⁸O₅ target
- One ⁶Li detector fixed at 35 degrees to monitor flux
- A moveable ⁶Li glass at a distance of 20 cm
- Neutron energy measured by means of time-offlight between beam pickup and detector
- Average proton intensity $\sim 0.5 \ \mu A$
- Charge measured by current integration
- Beam time: 5 days, 10 shifts









Data analysis (on going)





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Preliminary data (analysis ongoing)







Summary, challenges and outlook

- We are designing a heavy-water target for 5 keV neutron production at SARAF.
- Precise characterization of neutron flux is required.
- A measurement performed at PTB to measure the neutron spectrum for the

¹⁸O(p,n) reaction at $E_p = 2582$ keV.

- Beam energy was off 2587 keV -> target thickness was not sufficient.
- Analysis is ongoing.
- PTB will repeat the measurement at the correct energy later this month.







Thanks for listening!







