

Improving Zr cross sections: $^{90}\text{Zr}(n,\gamma)$

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Zr Measurements and Evaluation

- Goal: Improve the $^{90,91,92,94}\text{Zr}$ resonance parameters
- Investigating:
 - Comparison to ENDF/B-VIII.0
 - Discrepancies with previous data
- Evaluation potentially using:
 - Harvey/De - 1975 (ORNL transmission measurements)
 - Tagliente - 2008

Existing Zr-90 measurements

- 2 high-resolution capture measurements

- Tagliente et al. 2008

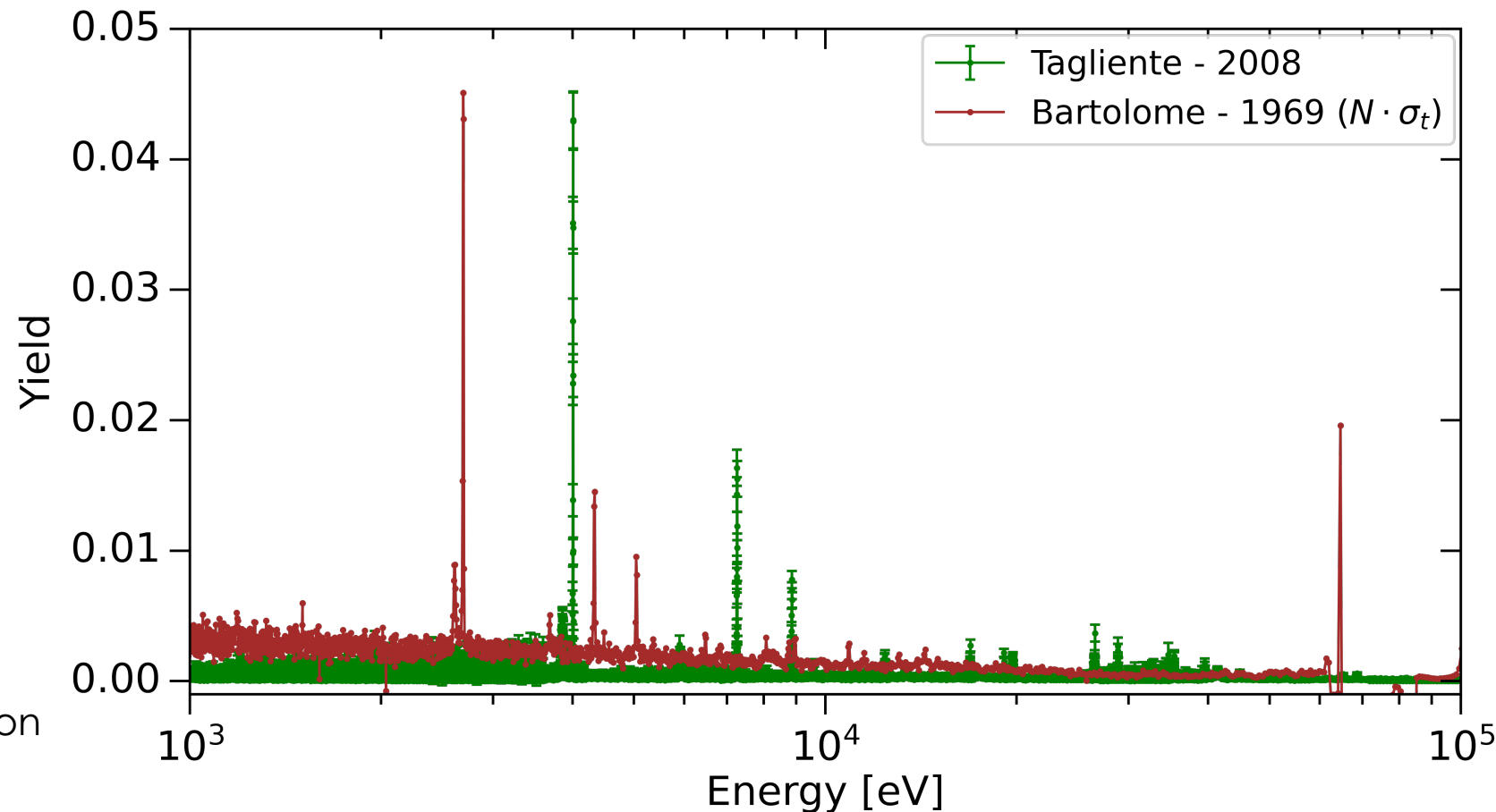
- ZrO₂ sample
 - Enrichment 97%
 - $n = 0.0035$ [at/b]
 - FP: 185 m

- Bartolome et al. 1969

- ZrO₂ sample
 - Enrichment: 97%
 - $n = 0.0109$ [at/b]
 - FP: 25 m
 - *questionable energies*
 - *No uncertainty*

- Boldeman et al. 1975

- Only res. widths & publication

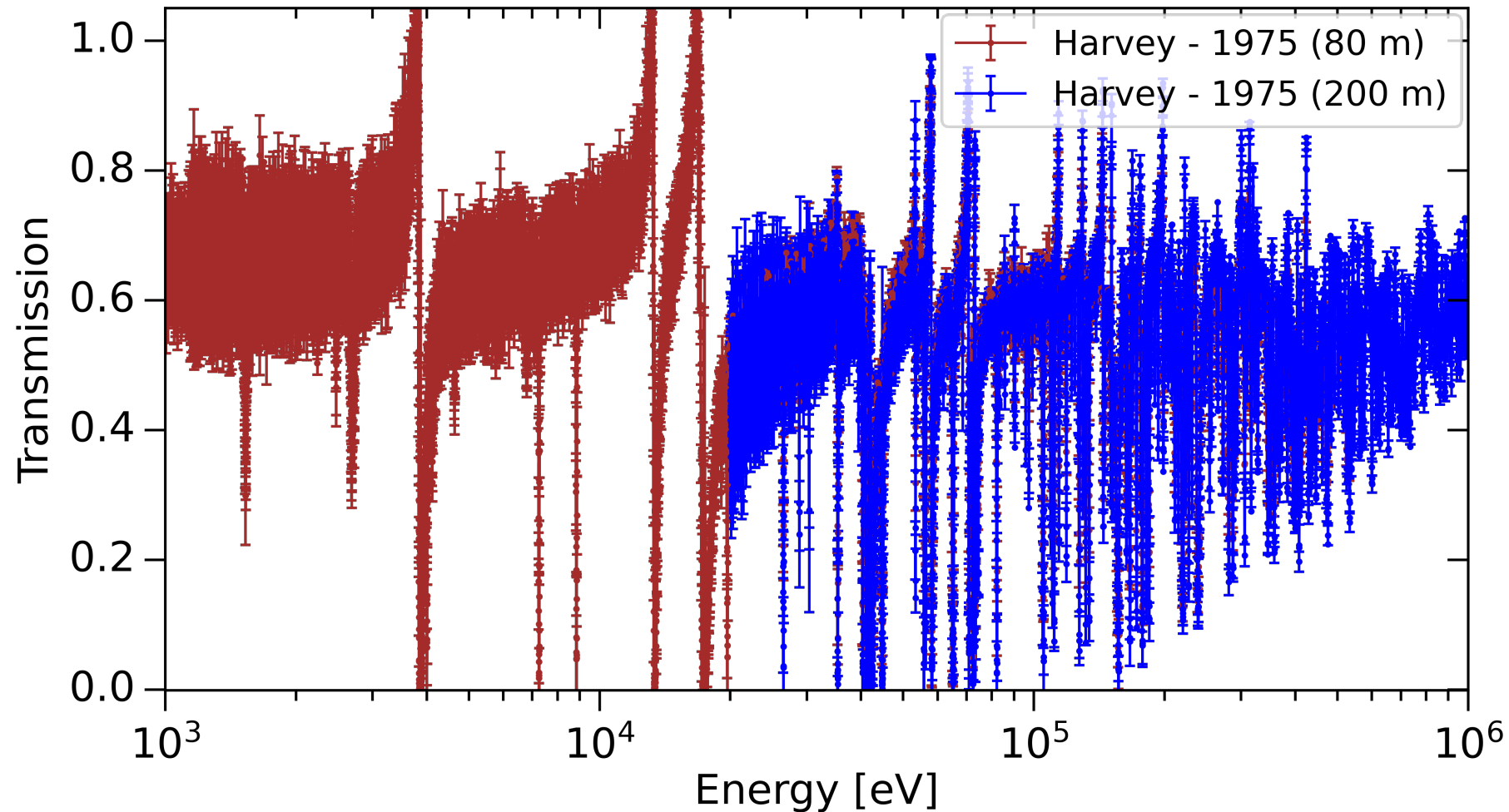


Existing Zr-90 measurements

- 1 set of high-resolution transmission measurements

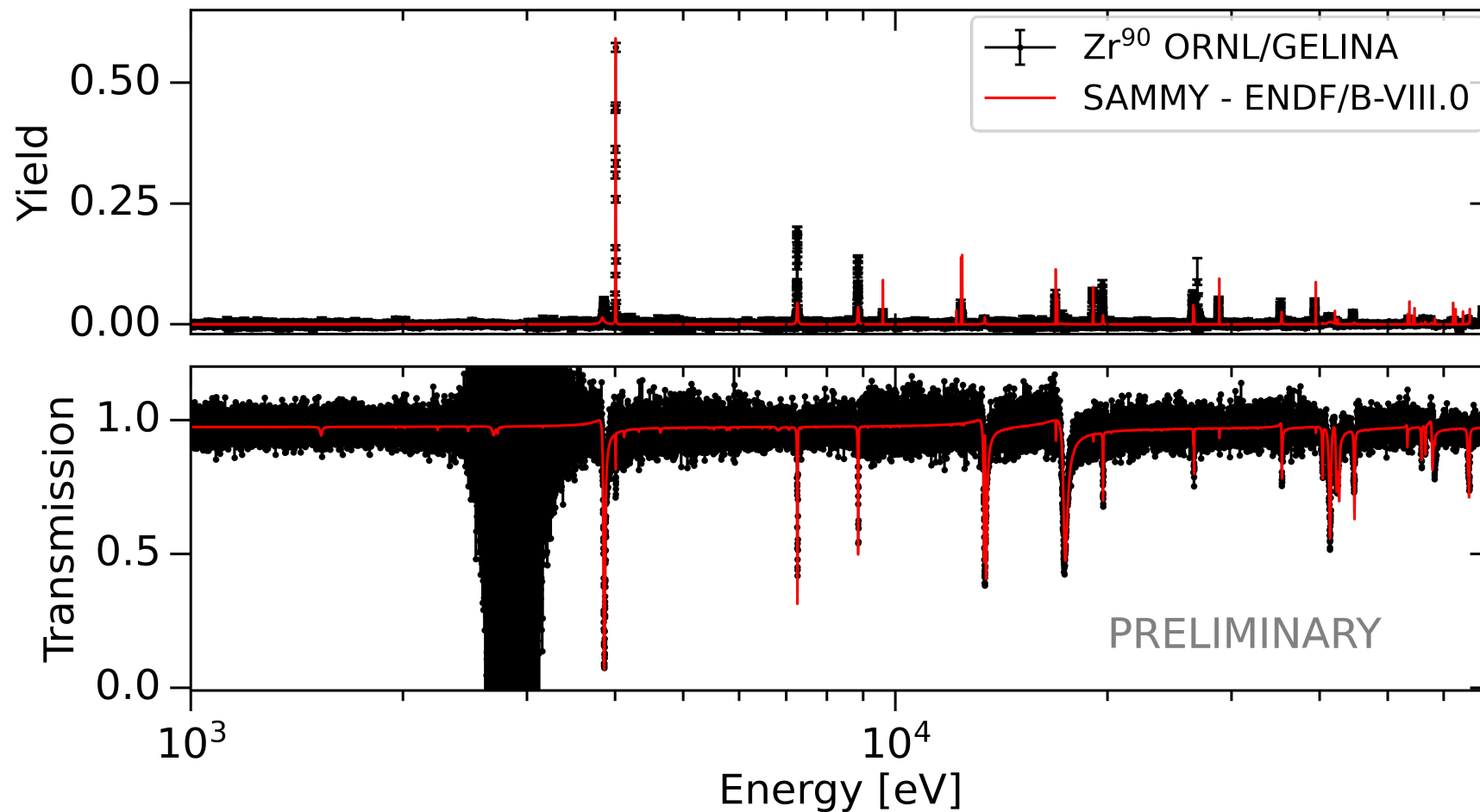
- Harvey/De – 1975

- Metallic Zr
 - Enrichment: 97%
 - $n = 0.0827$ [at/b]
 - FP: 80 m
 - FP: 200 m



Recent GELINA measurements: $^{90}\text{Zr}(n, \gamma)$ and $^{90}\text{Zr}(n, \text{tot})$

- Metallic Zr
- Enrichment: 97%
- $n = 0.0051$ [at/b]
- FP: 60 m
- C_6D_6 capture system



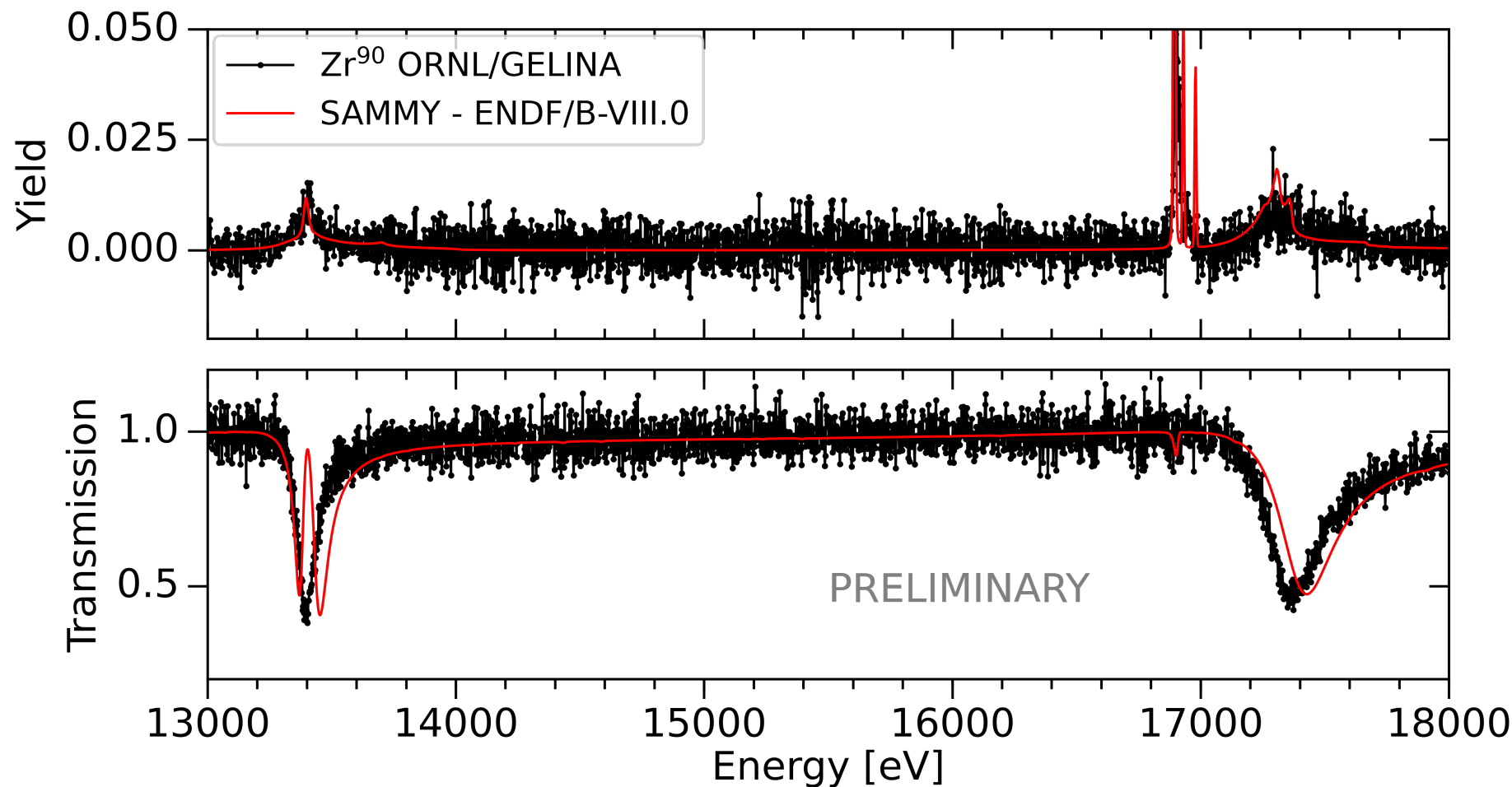
Recent GELINA measurements: $^{90}\text{Zr}(n, \gamma)$ and $^{90}\text{Zr}(n, \text{tot})$

Issues with ENDF/B-VIII.0

- 13.5 keV doublet
- 42.5 keV doublet
- Capture res's
- Spin assignments

New data

- Higher resolution
- Higher purity
- Include exp. cov.



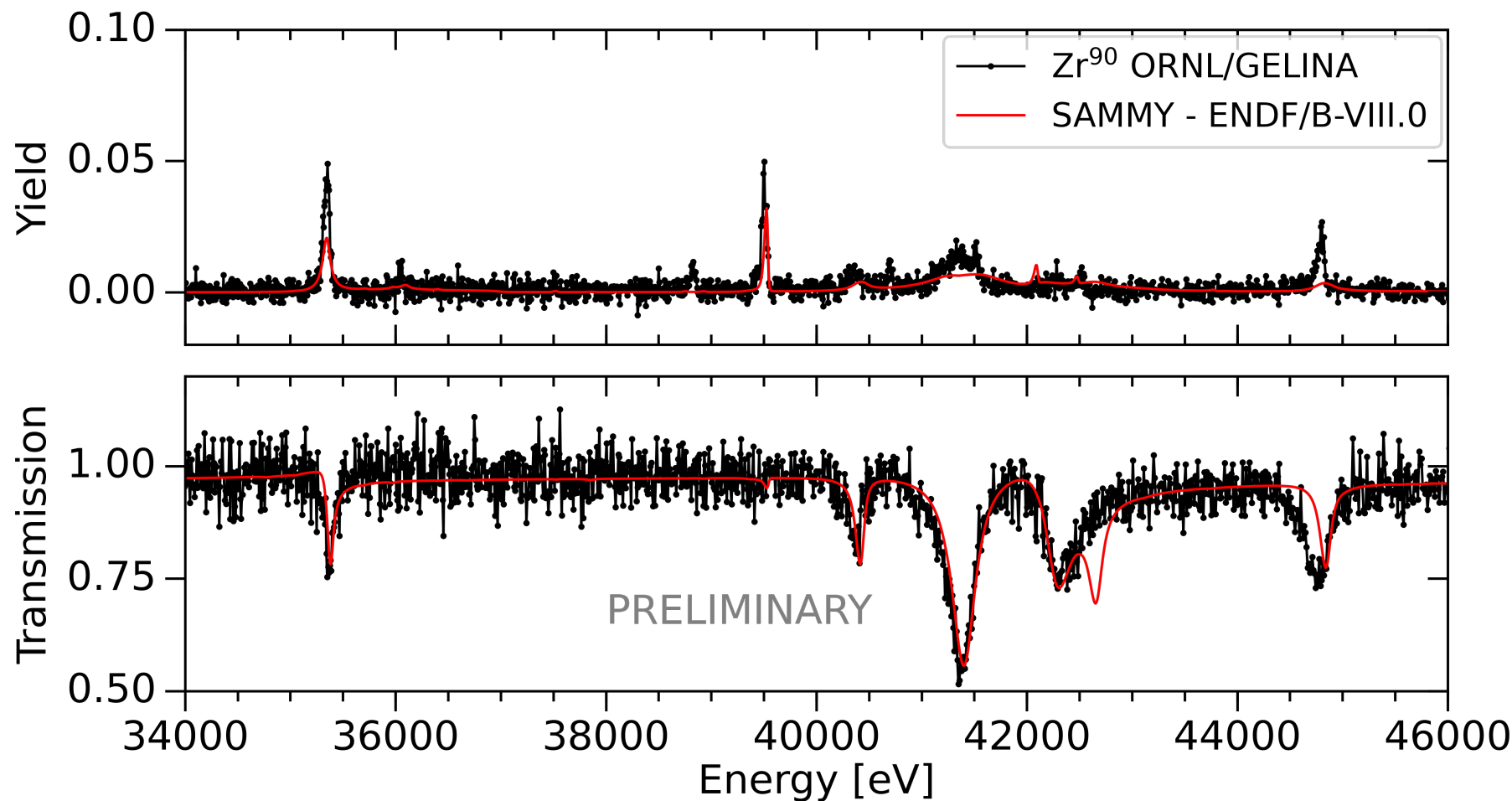
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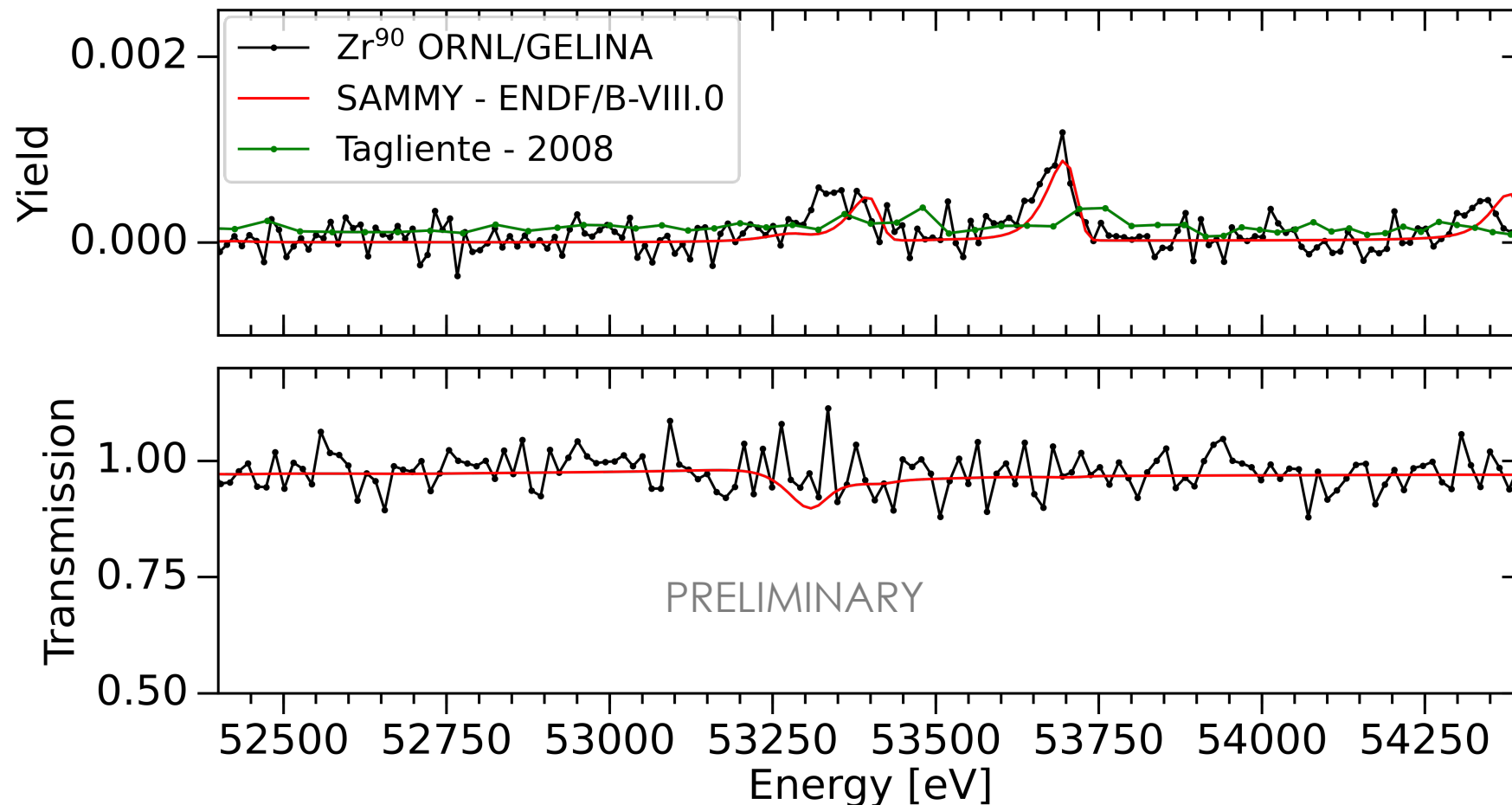
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Key take-aways

- First of 4 isotopes (90,91,92,94) to be measured
- ^{91}Zr is currently being measured at GELINA
- Once all measurements are done: jointly evaluate with SAMMY
 - Produce new evaluated resonance parameters and covariances
- Grad students
- New data will be used to improve evaluation information, benefitting transport calculations of reactors, waste storage, etc.

Acknowledgments

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