



Contribution ID: 1

Type: **Contributed Oral**

## Lifetime Measurement of the $0_3^+$ State in $^{120}\text{Sn}$

*Monday, 19 August 2024 17:35 (15 minutes)*

The semi-magic  $^{120}_{50}\text{Sn}_{70}$  lies in the neutron mid-shell among the other stable Sn isotopes, where  $2p - 2h$  intruder configurations built on excited  $0^+$  states have been recently observed. However, the transition rates from the  $0_3^+$  state in  $^{120}\text{Sn}$  are not well-known because its lifetime only has a lower limit of 6 ps, which prevents a firm assignment or exclusion of the  $0_3^+$  state into the intruder band.

The first thermal neutron capture experiment,  $^{119}\text{Sn}(n, \gamma^{\text{many}})^{120}\text{Sn}$ , was performed at the Institut Laue-Langevin, where the world's highest-flux thermal neutron beam was delivered at  $10^8$  n/cm<sup>2</sup>/s at the target position on an isotopically enriched  $^{119}\text{Sn}$  target. Low-spin states in  $^{120}\text{Sn}$  were populated up to  $S_n = 9.1$  MeV, and the decaying gamma-ray cascades were detected with the Fission Product Prompt Gamma-ray Spectrometer (FIPPS) comprised of eight Compton-suppressed HPGe clovers coupled to an array of 15 LaBr<sub>3</sub>(Ce) scintillation detectors. The LaBr<sub>3</sub>(Ce) scintillators, which were used for gamma-ray detection and lifetime measurement using the Mirror Symmetric Centroid Difference (MSCD) method, have fast timing responses and are ideal for extracting lifetimes between 10 and a few hundred ps.

In total, there are  $4 \times 10^9$  counts in the  $\gamma\gamma\gamma$  cube where two LaBr<sub>3</sub>(Ce) events were in coincidence with one HPGe. Preliminary lifetimes in  $^{120}\text{Sn}$  using the MSCD technique will be reported.

### Funding Agency

NSERC

### Email Address

twa73@sfu.ca

### Presenter if not the submitter of this abstract

**Primary authors:** MICHELAGNOLI, Caterina (Institute Laue-Langevin); ANDREOIU, Corina (Simon Fraser University); PETRACHE, Costel (University Paris-Saclay and IJClab, CNRS/IN2P3, 91405 Orsay, France); WU, Frank (Tongan) (Simon Fraser University); REGIS, Jean Marc (IKP University of Koeln); SPAGNOLETTI, Pietro (Simon Fraser University); KARAYONCHEV, Vasil (Argonne National Laboratory)

**Presenter:** WU, Frank (Tongan) (Simon Fraser University)

**Session Classification:** Nuclear Structure I

**Track Classification:** Nuclear Structure from Collisions