Search of the Exotic Nuclear Two-Photon Decay in Isochronous Heavy Ion Storage Rings

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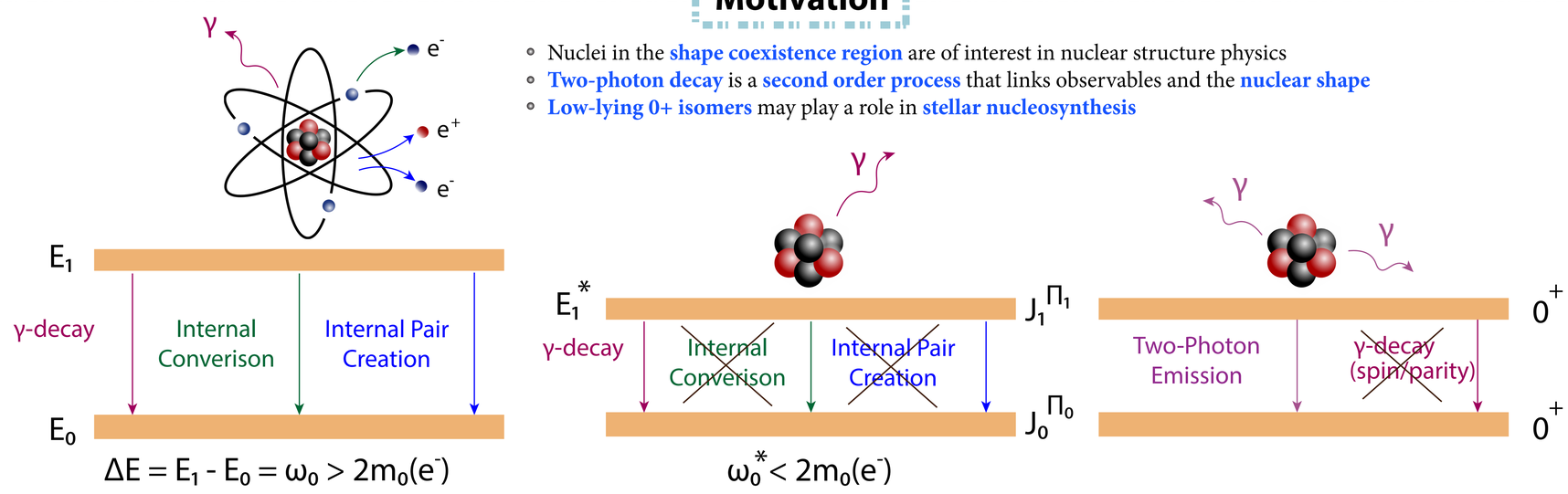
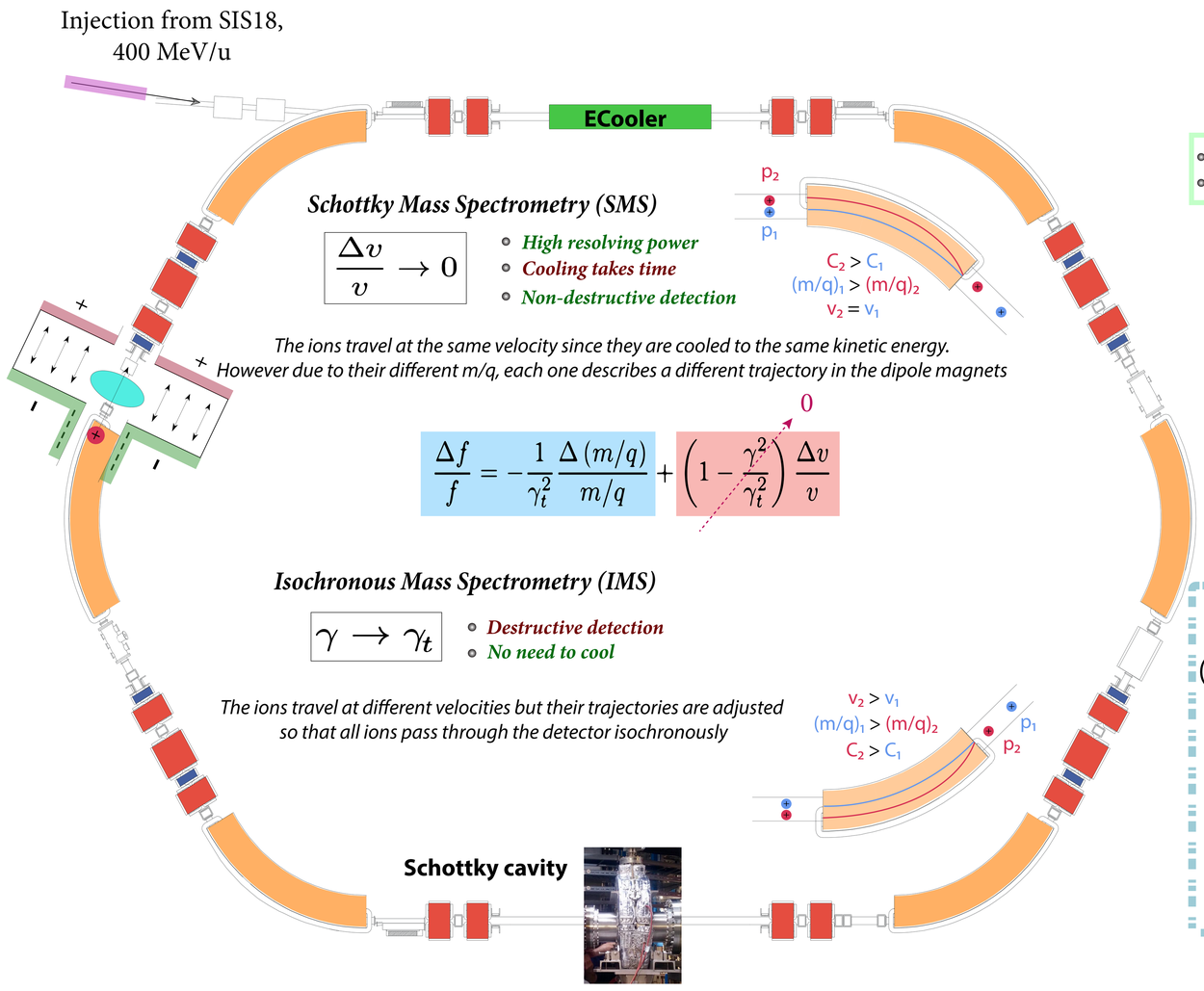
Motivation



- Nuclei in the **shape coexistence region** are of interest in nuclear structure physics
- **Two-photon decay** is a **second order process** that links observables and the **nuclear shape**
- **Low-lying 0+ isomers** may play a role in **stellar nucleosynthesis**

Methodology and Results



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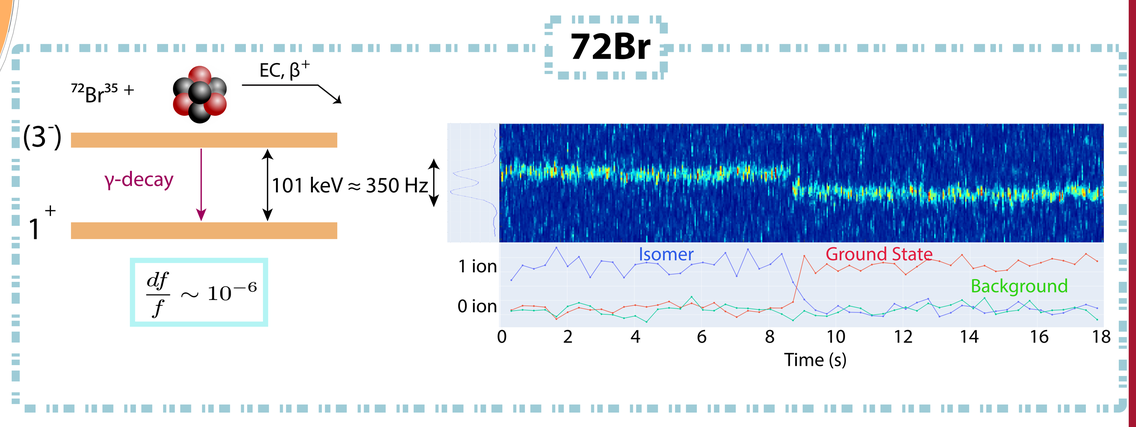
SMS
- *Not suitable for exotic nuclei*
- *Suitable short-lived nuclei*

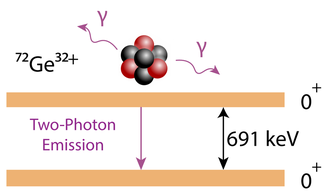
IMS
- *Not suitable for nuclei with half-lifes under a few seconds*
- *Suitable for nuclei with low-production yields*

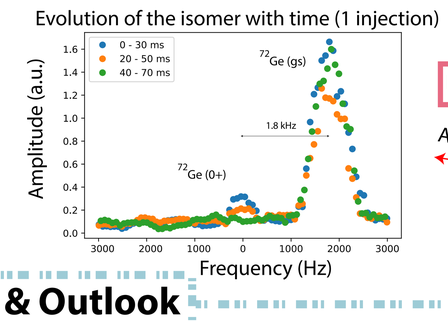
Isochronous Schottky Mass Spectrometry (ISMS)
- **Novel technique:** Combination of SMS and IMS
- Best suited for the study of **exotic short-lived** isomers and nuclear states

72Br



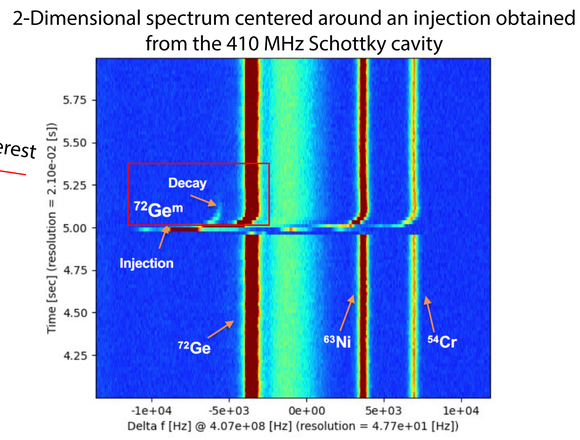
72Ge

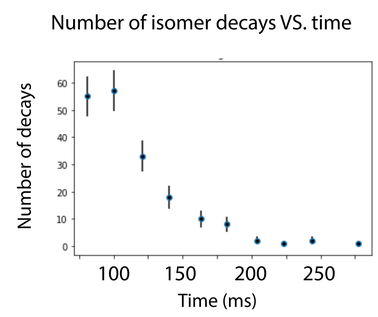




Decay time < 80 ms

Analysis of the region of interest

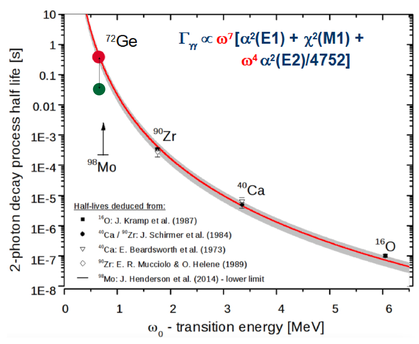




Conclusions & Outlook

- **Proof of principle - *Isochronous Schottky Mass Spectrometry (ISMS):***
  - Feaseability of a **novel technique** for **exotic short-lived** mass spectrometry. It uses a **combination** of Schottky Mass Spectrometry (SMS) and Isochronous Mass Spectrometry (ISMS).
- **Highly suited** for the study of **exotic short-lived low-lying nuclear isomers** with a resolving power of 10^{-6}, allowing the resolution of **100 keV isomers**
- *Preliminary results* indicate that the lifetime of the first excited state in 72Ge is **considerably shorter** than expected from previous experiments Therefore, further **theoretical studies are necessary**

(Analysis still ongoing!)



Acknowledgements

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