



ID de Contribution: 50

Type: Oral Presentation

## Is there a dark decay of neutrons in ${}^6\text{He}$ ?

*jeudi 28 septembre 2023 17:05 (20 minutes)*

The neutron lifetime discrepancy between beam and bottle experiments of  $4\sigma$  could be interpreted as a possible sign of the neutron decaying into dark particles [1]. If such a decay exists, it could also occur in unstable nuclei with sufficiently low neutron binding energy, a quasi-free neutron decay into a dark matter particle  $\chi$ ; as is the case of  ${}^6\text{He}$  with  $S_{2n} = 975.45\text{keV} < m_n - m_\chi$  [2]. This quasi-free neutron dark decay would be as followed:  ${}^6\text{He} \rightarrow {}^4\text{He} + n + \chi$  which is the only way to have the emission of a free neutron in the decay of  ${}^6\text{He}$ . The SPIRAL1 facility at GANIL was used in June 2021 in order to produce a pure  ${}^6\text{He}^{1+}$  radioactive beam at 25keV to observe an excess of neutrons in the decay of  ${}^6\text{He}$  which would be a unique signature for dark matter creation. In this presentation, we report the results of this experiment to set an upper limit for this dark decay mode in  ${}^6\text{He}$ .

### References

- [1] Bartosz Fornal and Benjamin Grinstein. “Dark Matter Interpretation of the Neutron Decay Anomaly” in: Phys. Rev. Lett. 120 (19 May 2018), p. 191801. doi: 10.1103/PhysRevLett.120.191801. url: <https://link.aps.org/doi/10.1103/PhysRevLett.120.191801>.
- [2] M. Pfützner and K. Riisager. “Examining the possibility to observe neutron dark decay in nuclei” in: Phys. Rev. C 97 (4 Apr. 2018), p. 042501. doi: 10.1103/PhysRevC.97.042501. url: <https://link.aps.org/doi/10.1103/PhysRevC.97.042501>.

**Auteurs principaux:** M. LEJOU BIOUX, Marius (GANIL); SAVA JOLS, Hervé (GANIL/CNRS)

**Orateur:** M. LEJOU BIOUX, Marius (GANIL)

**Classification de Session:** Fundamental interactions and symmetries

**Classification de thématique:** Fundamental Interactions