Contribution ID: **377** Type: **Poster**

BOLD: three strategies for detecting single Ba ions in NEXT using molecular indicators

Tuesday, 18 June 2024 17:30 (2 hours)

Experiments searching for neutrinoless double beta decay (0νββ) are pushing the boundaries of technology to achieve sensitivities to half-lives on the order of 10^{28} years or beyond. A promising approach involves detecting the daughter barium ion generated in the double beta decay of ^{136}Xe. The NEXT collaboration is investigating chemical sensors to identify the Ba^{2+} coinciding with the emission of two electrons. This entails a challenge, since only a few signal-candidate ions per year would be produced in the NEXT chamber. Further the chemosensors must be compatible with the ultra-dry conditions of xenon gas.
The NEXT group working in Barium tagging is exploring different families of molecular indicators which produce different types of fluorescence signals upon binding to Ba^{2+}. First: on-off molecules, with high yield when forming a complex with Ba^{2+}. Second: bi-color molecules, with spectral emission shift when they interact with the ion. Third: time-resolved molecules with different decay lifetimes. Different surface-science techniques are being developed to characterise each molecular family and will be detailed in this contribution. Furthermore, a custom-engineered, finely-tuned Ba^{2+} beam is being developed to reproduce the conditions in the final NEXT detector of high pressure xenon. The response of the fluorescent molecules after exposure to this beam will assure the viability of such a barium tagging sensor.

Poster prize

Yes

Given name

Pablo

Surname

Herrero Gómez

First affiliation

Hebrew University

Second affiliation

DIPC

Institutional email

pablo.herrero-gomez@mail.huji.ac.il

Gender

Male

Collaboration (if any)

NEXT

Primary author: HERRERO GOMEZ, Pablo (Donostia International Physics Center)

Presenter: HERRERO GOMEZ, Pablo (Donostia International Physics Center)

Session Classification: Poster session and reception 1

Track Classification: Neutrinoless Double Beta Decay