



Contribution ID: 109

Type: **Parallel talk**

## Neutron calibrations in dark matter searches: the ANAIS-112 case

*Wednesday 30 August 2023 14:30 (15 minutes)*

ANAIS is a direct dark matter detection experiment whose goal is to confirm or refute in a model independent way the positive annual modulation signal reported by DAMA/LIBRA. ANAIS-112, consisting of 112.5 kg of NaI(Tl) scintillators, is taking data at the Canfranc Underground Laboratory in Spain since August 2017. Results corresponding to the analysis of three years of data show no modulation and are incompatible with DAMA/LIBRA. However, testing this signal relies on the knowledge of the scintillation quenching factors (QF) for the conversion of nuclear recoil energy depositions with respect to the same energy deposited by electrons. Previous measurements of the QF in NaI(Tl) do not agree. Consequently, in order to fully understand the response of the ANAIS-112 detectors to nuclear recoils, a specific neutron calibration program is being developed. This program combines two different approaches: on the one hand, sodium QF measurements were carried out in a monoenergetic neutron beam; on the other hand, the study presented here aims at the evaluation of the QF by exposing directly the large ANAIS-112 crystals to neutrons from low activity  $^{252}\text{Cf}$  sources. Comparison between the onsite neutron calibrations and detailed GEANT4 simulations of the full experimental set-up allows testing different QF models. Some results will be discussed. In addition, preliminary efforts to include the non-linear light response of NaI(Tl) in the simulations will be presented.

### Submitted on behalf of a Collaboration?

Yes

**Primary author:** Mrs PARDO YANGUAS, Tamara (CAPA, University of Zaragoza, Spain)

**Co-authors:** Dr AMARÉ, Julio (CAPA, University of Zaragoza); Mr APILLUELO, Jaime (CAPA, University of Zaragoza); CEBRIAN, Susana (Universidad de Zaragoza); Mr CINTAS GONZÁLEZ, David (Universidad de Zaragoza); COARASA CASAS, Iván (CAPA, University of Zaragoza, Spain); Dr GARCÍA, Eduardo (CAPA, University of Zaragoza); Dr MARTÍNEZ PÉREZ, María (CAPA, University of Zaragoza); OLIVÁN, Miguel Ángel (Universidad de Zaragoza); Dr ORTIGOZA, Ysrael (CAPA, University of Zaragoza); ORTIZ DE SOLÓRZANO, Alfonso; PUIMEDON, Jorge (Universidad de Zaragoza); Dr SALINAS, Ana (CAPA, University of Zaragoza); SARSA, María Luisa (University of Zaragoza); Dr VILLAR, Patricia (CAPA, University of Zaragoza)

**Presenter:** Mrs PARDO YANGUAS, Tamara (CAPA, University of Zaragoza, Spain)

**Session Classification:** Dark matter and its detection

**Track Classification:** Dark matter and its detection