



Contribution ID: 118

Type: **not specified**

## Modeling and Optimization of Experimental Setup Geometry for Measuring Ultracold Neutron Loss Factors Using Gravitational Spectroscopy

*Thursday, 29 May 2025 09:50 (15 minutes)*

This study presents numerical and analytical investigations aimed at optimizing the measurement of ultracold neutron (UCN) loss factors on various materials using the gravitational [1] spectroscopy method. The optimization of experimental setup geometry was performed through numerical simulations, allowing for the determination of optimal parameters to enhance measurement accuracy. Within the UCN gas [1] model framework, time dependencies of storage, filling, and emptying of neutron vessels were calculated, and measurement uncertainties for UCN loss factors were evaluated for different materials (deuterated polyethylene, diamond-like carbon, and beryllium). Estimated exposure times were obtained, and the dependence of statistical data collection time on the sample surface area was analyzed, enabling the determination of optimal experimental conditions. The results of this study can be utilized to improve the precision and efficiency of experiments investigating ultracold neutron interactions with surfaces.

**Primary author:** KURMANALIYEV, Zhanibek (JINR)

**Presenter:** KURMANALIYEV, Zhanibek (JINR)

**Session Classification:** Parallel Session 3: Neutron detection & Methodical aspects/Physics of ultracold neutrons

**Track Classification:** Parallel session: Parallel session 3