ID contributo: **591** Tipo: **Poster**

# Understanding gravitationally induced decoherence parameters in neutrino oscillations using a microscopic quantum mechanical model

*martedì 18 giugno 2024 17:30 (2 ore)*

In this poster, a microscopic quantum mechanical model for gravitationally induced decoherence in the context of neutrino oscillations is presented. The focus is on the comparison with existing phenomenological models and the physical interpretation of the decoherence parameters in such models. The results show that for neutrino oscillations in vacuum gravitationally induced decoherence can be matched with phenomenological models with decoherence parameters of a specific form. When matter effects are included, the decoherence parameters show a dependence on matter effects, which vary in the different layers of the Earth, that can be explained with the form of the coupling between neutrinos and the gravitational wave environment inspired by linearised gravity. Consequently, in the case of neutrino oscillations in matter, the microscopic model does not agree with many existing phenomenological models that assume constant decoherence parameters in matter, and their existing bounds cannot be used to further constrain the model considered here. The probabilities for neutrino oscillations with constant and varying decoherence parameters are compared and it is shown that the deviations can be up to 10%. Furthermore, the quantum mechanical model is compared with master equations derived from a field-theoretic model based on linearised gravity.

## Poster prize

Yes


## Given name

Max Joseph

## Surname

Fahn

## First affiliation

ECAP, FAU Erlangen-Nürnberg

## Second affiliation

Institute for Quantum Gravity, FAU Erlangen-Nürnberg

## Institutional email

max.j.fahn@fau.de

## Gender

Male

## Collaboration (if any)

**Autori principali:** DOMI, Alba; EBERL, Thomas; FAHN, Max Joseph; GIESEL, Kristina; HENNIG, Lukas; KATZ, Ulrich; KEMPER, Roman; KOBLER, Michael

**Relatore:** FAHN, Max Joseph

**Classifica Sessioni:** Poster session and reception 1

**Classificazione della track:** Neutrino oscillations