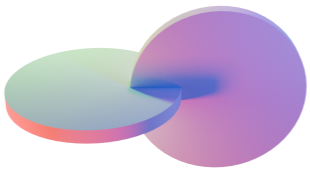

GIREP-EPEC
Transforming physics learning via Research & Practice
LEIDEN, 2025

Contribution ID: **15** Type: **Oral presentation**

Teaching quantum mechanics without waves or matrices

Monday 30 June 2025 14:30 (20 minutes)

In 1925, quantum mechanics was discovered by Heisenberg in the form of matrix mechanics, which was quickly superseded by Schrödinger's wave mechanics in 1926. The former worked in an energy eigenspace representation, while the latter predominately in a position-space representation. There is a third way to formulate quantum mechanics in a representation-independent fashion, that I call operator mechanics. In this talk, I will describe how operator mechanics works and show how to teach quantum mechanics this way. The work I discuss is summarized in a forthcoming book called *Quantum Mechanics Done Right* from Springer-Nature.

Education level

Age over 18 (excluding teacher education)

Physics topic

Quantum mechanics

Research focus

Innovative instructional strategies and pathways

Research method

Educational design research (Qualitative research)

Organizing preference criteria

Track

Author: FREERICKS, James

Presenter: FREERICKS, James

Session Classification: Parallel oral presentations

Track Classification: Quantum education (QUANT)