Using Artificial Intelligence in the Quantum Mirror

Question

What is the best strategy (considering what AIs do best) for students to learn Quantum Mechanics in the Quantum Mirror project?

Answer (ChatGPT)

The most effective strategy is not to use AI to generate problems or explanations, but to reveal errors.

AI is excellent at:

- generating plausible answers,
- making consistent structural mistakes,
- appearing convincing even when it is wrong.

For this reason, its most powerful use is as an **object of audit**, not as a primary source of content.

Suggested method

1. **The instructor defines the hard core of the lecture:** central concepts, carefully chosen examples, and points of conceptual inversion. This step is irreplaceable.
2. **The AI generates plausible responses:** solving problems, explaining concepts, or simplifying arguments — without guaranteeing correctness.
3. **The student audits the AI:**
    - identify errors,
    - classify the type of error (calculation, structure, interpretation),
    - explain why the answer appears correct.

4. **The instructor makes explicit the distinctive element of the lecture:** highlighting the conceptual point that the AI failed to capture, creating contrast between real understanding and plausible reconstruction.

Ideal activity format

1. Problem proposed by the instructor
2. Response generated by AI (with a subtle or structural error)
3. Student task: analyze, critique, and correct

Why this works in Quantum Mechanics

- there are abstract objects (dual spaces, operators),
- formal rules that are easy to apply mechanically,
- delicate conceptual interpretation.

These characteristics make the discipline especially sensitive to plausible errors — precisely where AI tends to fail.

Central insight

Learning Quantum Mechanics is not only about arriving at the correct answer, but about recognizing when an apparently correct answer is, in fact, wrong.

Summary

Use AI as a generator of controlled hallucinations — and teach students to dismantle them.

Answer generated by ChatGPT