

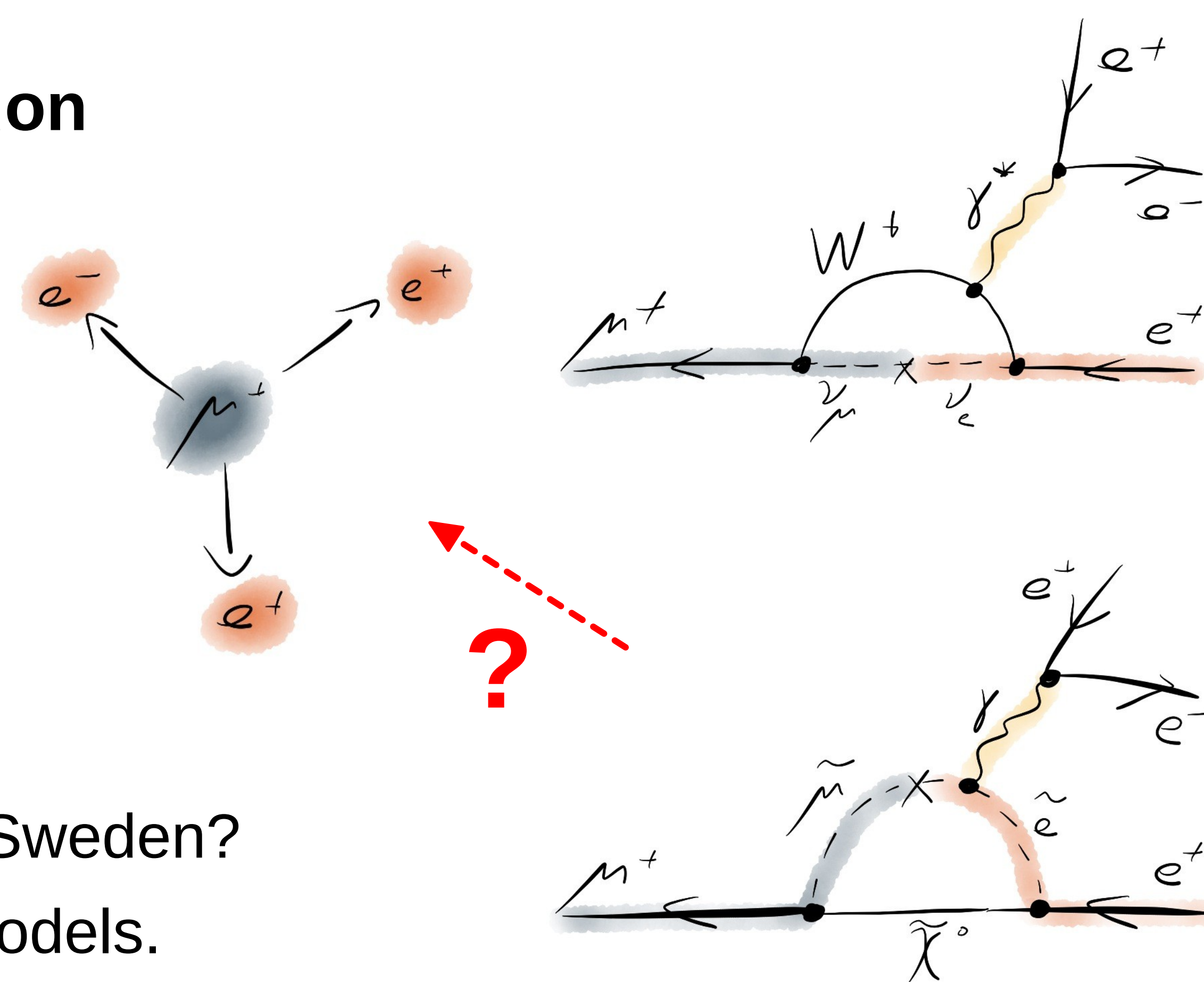


Exploring Forbidden Territory: The Mu3e Experiment and its Vertex Detector

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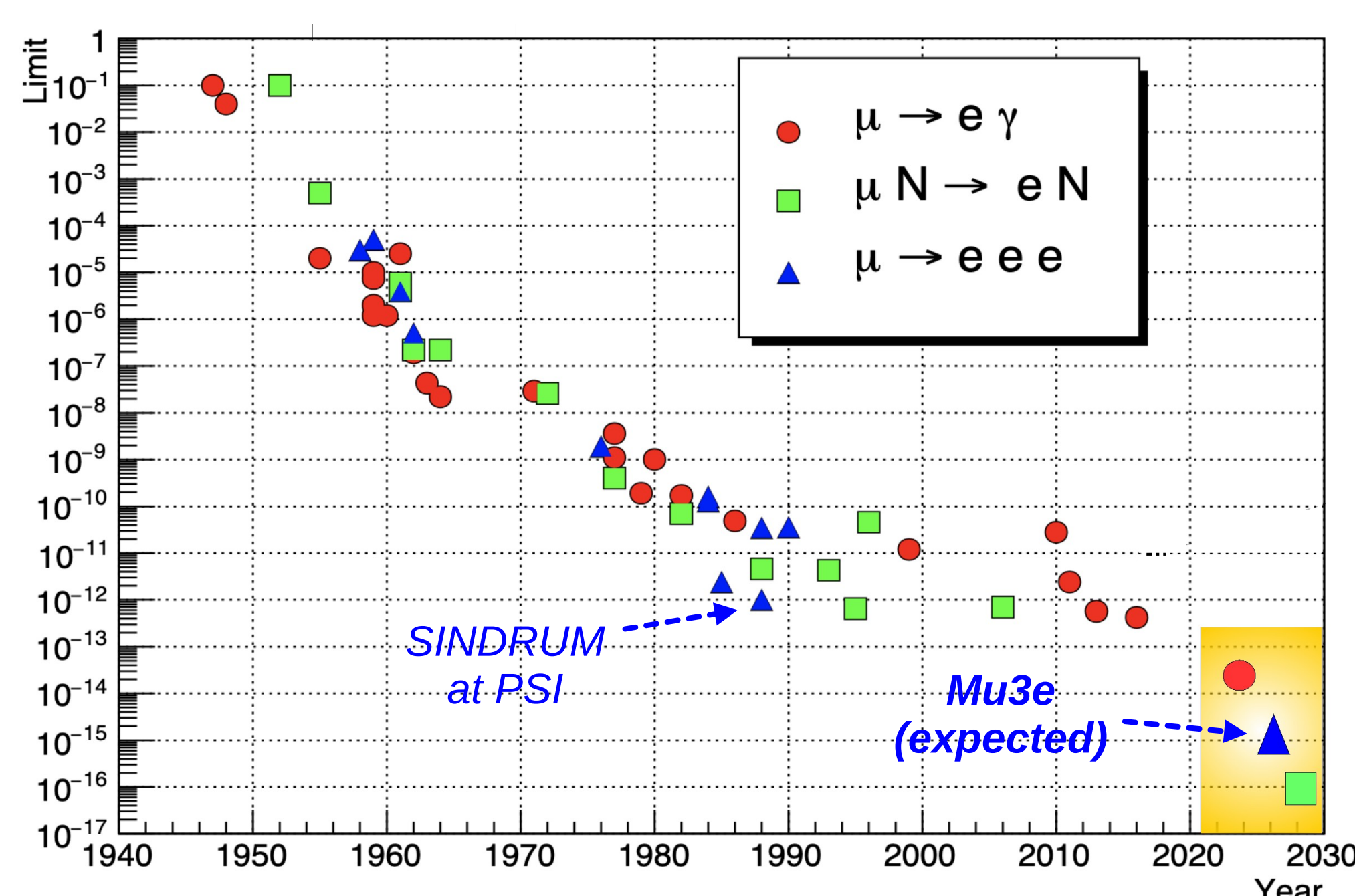
The quest: search for the decay of a (positively charged) muon to a positron and an electron/positron pair

- Violates **Lepton Flavour Number Conservation**.
- **“Forbidden”** in the Standard Model: only one in about 10^{54} muons predicted to decay in this way.
- Could be much more likely in various models of **“New Physics”**.



The prize:

- Observe a signal: **invitation to a banquet** with the king of Sweden?
- Observe no signal: **constrain or exclude** “New Physics” models.

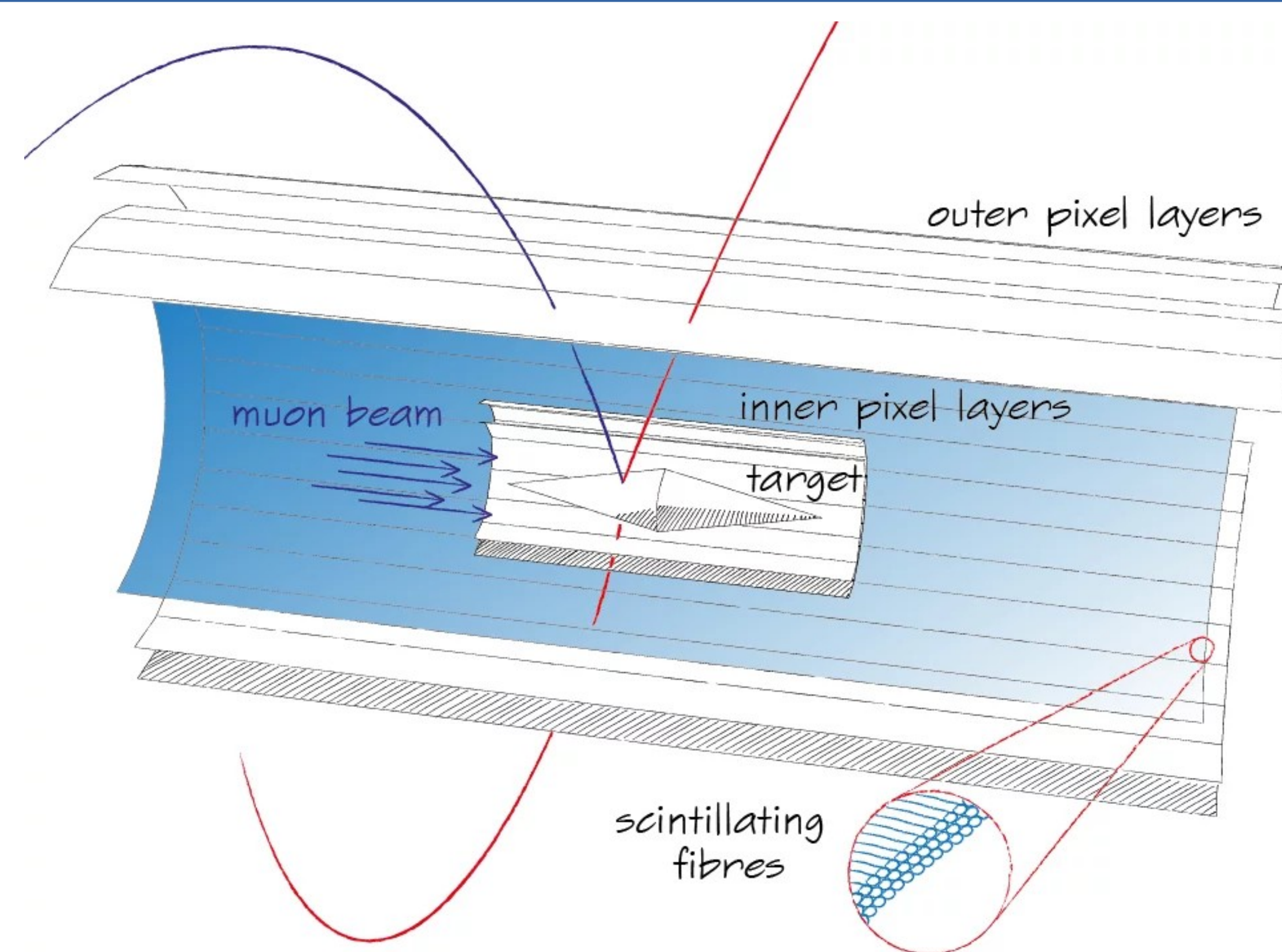


The challenge(s):

- Improve on current best limit (35 years old) by three orders of magnitude: need **huge number of muon decays**.
- Measure low-momentum electrons/positrons from muon decays: need **extremely low-mass detector**.
- Suppress wrong combinations of electrons/positrons: need **excellent position, time and momentum resolution**.

The approach:

- Use **muons from a high-intensity beam** at PSI, stop them in a thin carbon target.
- Use a **novel type of low-mass silicon pixel detector** to measure trajectories of decay electrons and positrons.
- Use a **super-conducting solenoid magnet** to measure their momentum.
- Use **scintillating fibre and pad detectors** for precision time measurement.



The fellowship:

- Collaboration of about 85 people from ETHZ, PSI, **UZH**, University of Geneva, institutes in Germany and the UK.

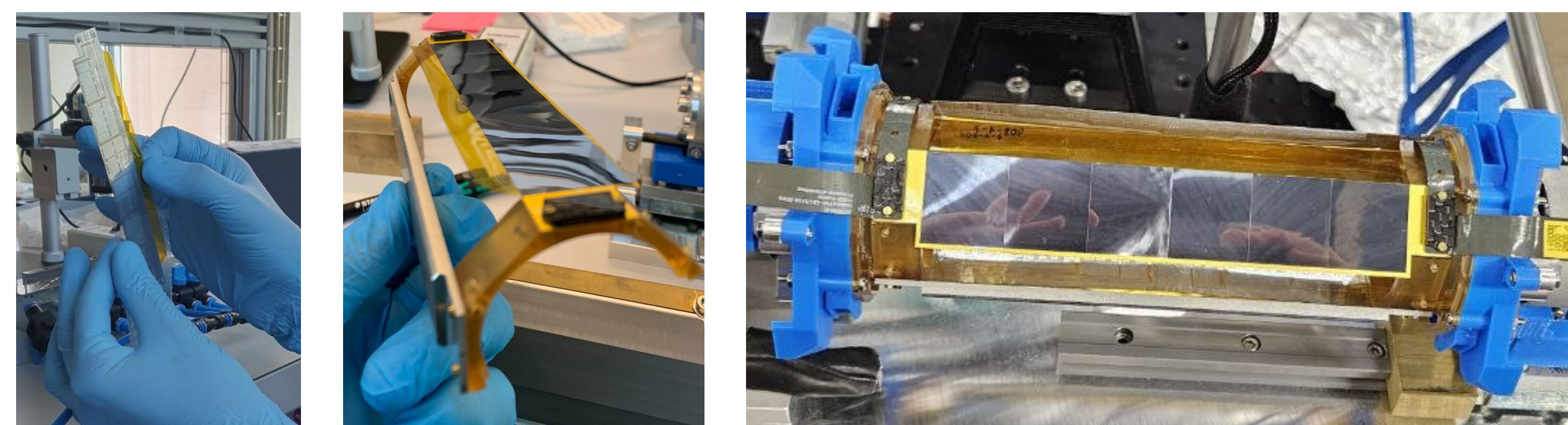


The timeline:

- **Production of components** is underway.
- **Assemble and commission** the apparatus in 2025/26.
- Take **first physics data** before the end of 2026.

The role of UZH:

- Participation in the assembly, installation and commissioning of the **“inner pixel layers”**.



To learn more about us and our adventure:

- visit our web page at: <https://www.physik.uzh.ch/en/researcharea/Mu3e.html>

