

DUNE Phase II Physics

Inés Gil-Botella, CIEMAT

Chris Marshall, University of Rochester

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UNIVERSITY of
ROCHESTER

Ciemat

Centro de Investigaciones
Energéticas, Medioambientales
y Tecnológicas

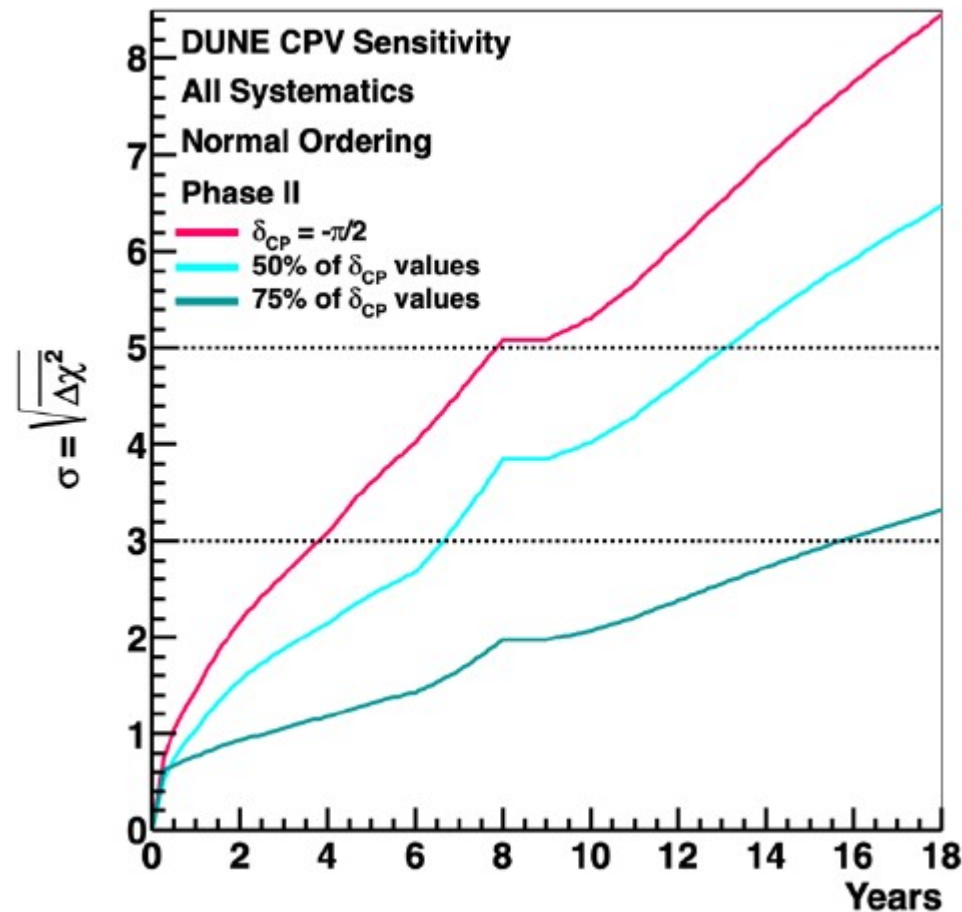


Summary

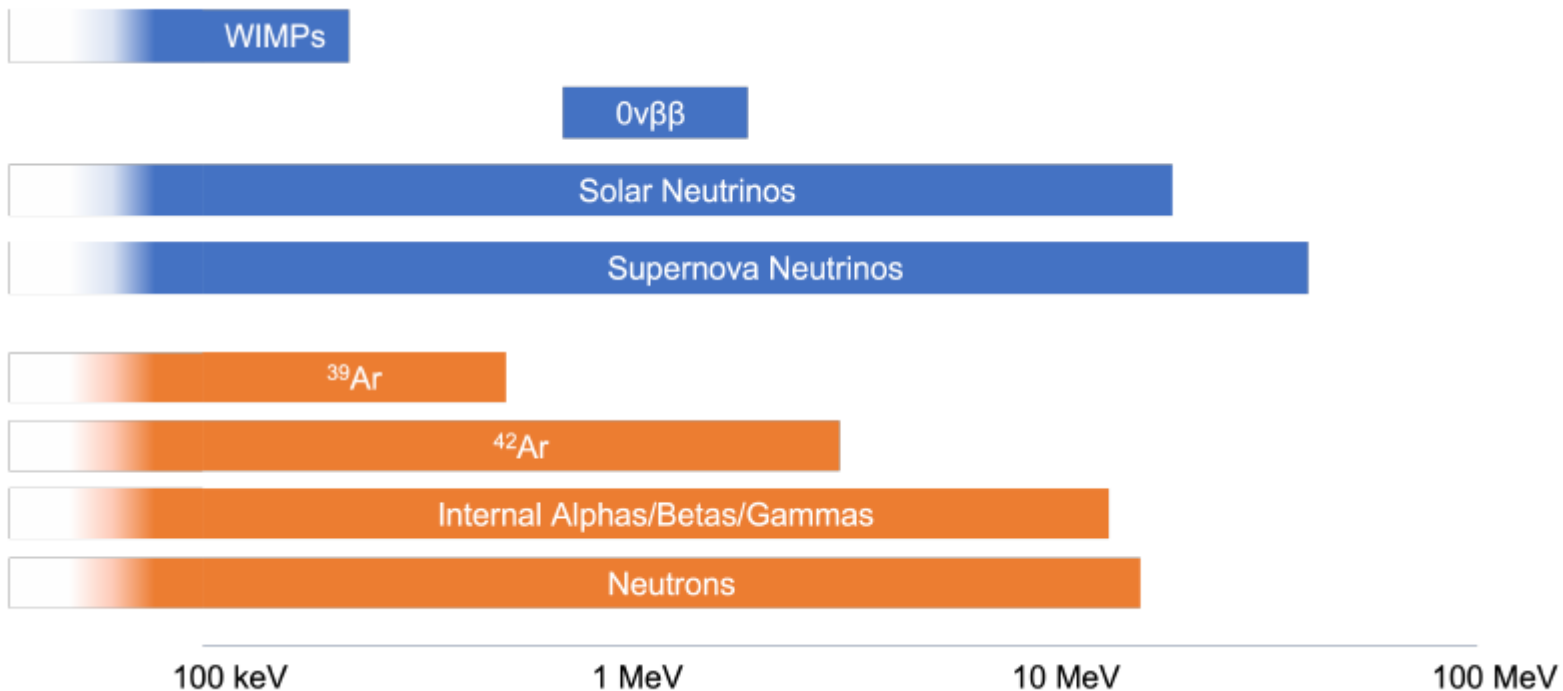
- Main priority of Phase II physics: complete the core DUNE physics program described in Physics TDR
 - Three-flavor oscillations, especially precision δ_{CP}
 - MeV-scale physics and astrophysics, especially SNB
 - BSM searches
- Additional goal: expand the physics reach beyond the core program
 - Additional low-energy reach (solar, DSNB)?
 - Extended dark matter reach?
 - Heavy neutrino sensitivity?
 - etc.

Long-baseline oscillation physics: FD mass & ND precision

- Phase II FD modules must provide $>10\text{kt}$ fiducial mass, and be compatible with ND constraints \rightarrow large LArTPC, or need specific ND strategy
- DUNE must not be systematically limited \rightarrow potential to improve ND constraint (ND-GAr)



MeV-scale neutrino physics and astrophysics



- Core goal: preserve supernova burst capability
- Triggering and energy reconstruction could be improved with better light collection in FD-3/4
- Sensitivity could be expanded to lower energy if backgrounds can be reduced
→ solar neutrinos, diffuse supernova neutrinos, ..., dark matter?

BSM physics

- ND-GAr could substantially expand DUNE sensitivity to heavy neutrinos, where the signal is decay (scales with volume) but background is scatter (scales with mass)
- FD-3/4 are important for searches with very low backgrounds, such as $p \rightarrow K\nu$

