

NEUTRINO OSCILLATIONS: THE NOMAD EXPERIMENT

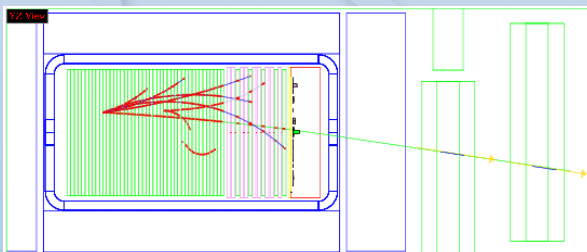
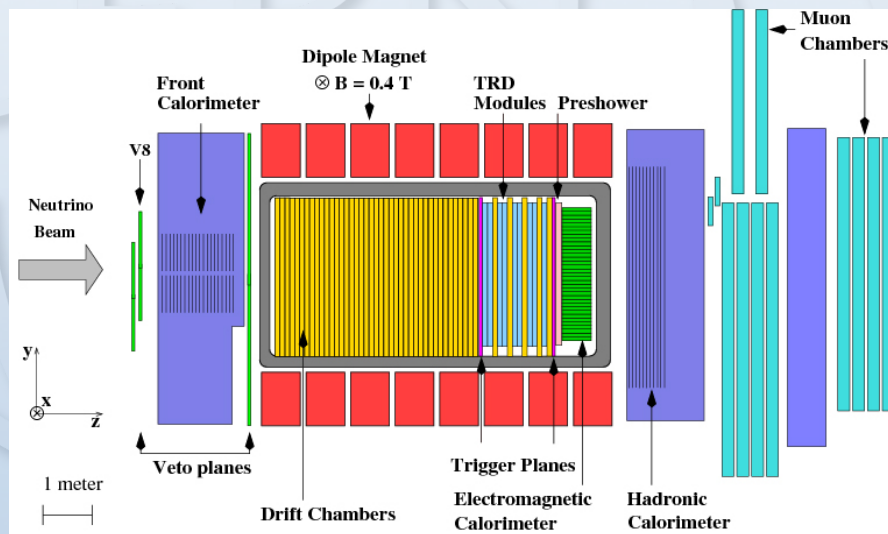


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60 YEARS OF SWISS SCIENCE AT CERN

In the 1960s it was observed that only about half of the expected flux of neutrinos produced in the Sun arrives on Earth. The "solar neutrino problem" has since been solved by requiring that the three neutrino species oscillate from one to the other with a frequency which depends on their difference in mass square. When it was proposed, the NOMAD experiment was motivated by theoretical arguments suggesting that the ν_τ may have a mass of $1 \text{ eV}/c^2$ or higher and oscillating over short distances into ν_μ .

The purpose of the NOMAD experiment was to look for evidence of $\nu_\mu \rightarrow \nu_\tau$ oscillations in a "short base line experiment". The experiment was located in the CERN West Hall. It is composed of drift chambers (the target), a transition radiation detector, an electromagnetic calorimeter installed inside a magnet providing a field of 0.4 T. The muon detectors is located outside the magnet. Kinematic criteria were used to recognize oscillations from mu neutrinos to tau neutrinos. The Lausanne University group was in charge construction of the **preshower**, placed in front of the electromagnetic calorimeter, and some of the drift chambers.



A typical muon-neutrino charged current interaction in NOMAD

We know today that ν_μ oscillate to ν_τ with an oscillation length much larger than the one available in NOMAD.

NOMAD has had important results on

- dimuon production in neutrino interactions, and
- production of Λ hyperons

These results will not be superseded before the advent of ν -factories.