

Sterile Neutrinos at Future Lepton Colliders

Stefan Antusch^{1,2}, Oliver Fischer^{1*}

¹ **Department of Physics, University Basel, Switzerland**

² **Max-Planck-Institute for Physics, Munich, Germany**

***oliver.fischer@unibas.ch**

Extending the Standard Model with sterile ('right-handed') neutrinos is one of the best motivated ways to account for the observed neutrino masses.

We discuss the expected sensitivity of the CEPC for testing such extensions.

An interesting scenario is given by symmetry protected seesaw models, which theoretically allow for sterile neutrino masses around the electroweak scale with up to order one mixings with the light (SM) neutrinos.

When the masses of the sterile neutrinos are well above the electroweak scale, they affect precision data via effective non-unitarity of the leptonic mixing matrix in a model independent way. The expected improvement of the electroweak precision observables from the CEPC may allow to test mixings between light and sterile neutrinos down to $\sim 5 \times 10^{-3}$ (using currently discussed CEPC performance parameters).

For sterile neutrinos with masses around the electroweak scale, direct searches are possible. Such tests are given by the search for sterile neutrino decays at the Z pole, by deviations from the SM cross section for four leptons at and beyond the W threshold, and by Higgs boson decays. We show the present bounds on the light-sterile neutrino mixings from LEP and LHC. The expected sensitivities at the CEPC could reach down to mixings as small as $\sim 5 \times 10^{-5}$.