

Status and perspectives of double beta decay searches

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Double beta decay is an extremely rare nuclear decay process characterised by a change in the atomic number Z by two units while leaving the mass number A constant. Basically it can occur in two modes, with the emission of two electrons and two anti-neutrinos or the emission of two electrons only. While the first mode is expected within the current Standard Model of Particle Physics, the neutrino-less double beta decay of nuclei is not allowed and thus its potential observation is of outstanding importance for neutrino physics and physics beyond the Standard Model. It can only occur if a neutrino is its own antiparticle and if it is massive. Especially for the first property double beta decay is considered as gold-plated process. However, due to the known smallness of the neutrino mass, the process is very rare and requires special low radioactive background environments.

After a general introduction into double beta decay and its role in neutrino physics, the seminar focusses on the current experimental searches and results and their implications for particle physics. An outlook towards future projects and the involved challenges is given, including a discussion on nuclear matrix elements and possible supporting experimental activities.

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