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Neutrino-nuclear responses and the value of the weak axial coupling

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The value of the weak axial coupling, g_A, has pervasive impact on neutrino-nucleus interactions in many fields: Nuclear astrophysics, neutrino physics and particle physics. In particular, nuclear beta decays and double beta decays, as also astro-(anti)neutrino-nucleus scattering and nuclear muon capture imply effective quenched or enhanced values of g_A, sometimes deviating a lot from the default PCAC value g_A = 1.27, valid for a free neutron. This quenching or enhancement of g_A in finite nuclei stems from, e.g., deficiencies of the nuclear many-body approaches used to describe the involved nuclear structures (restrictions in single-particle model spaces and/or configuration spaces, neglect of three-body forces, etc.), interference of non-nucleonic degrees of freedom, nuclear medium effects, like meson-exchange (two-body) currents, and so on. In my talk I try to highlight these features by several different examples.

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