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The pp neutrino flux and 205Pb/205Tl s-process chronometry

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Recent measurements performed at the GSI facilities have experimentally determined the value for the rate of 205Tl bound-state beta decay. This in turn allows to ascertain the nuclear transition matrix element to the first excited state of 205Pb. This information plays a crucial role in a twofold way.
On one hand, the bound-state beta decay of 205Tl could counter balance the 205Pb electron capture and keep the 205Pb production high during s-process nucleosynthesis, affecting the 205Pb/204Pb ratio and clarify the plausibility for the source of the live 205Pb in the early Solar System.
On the other hand, the capture of solar pp-neutrinos (0≤Eν≤420 keV) allows the transmutation of 205Tl nuclei into 205Pb. The energy threshold for this reaction is Eν≥52 keV, by far the smallest threshold for any known neutrino-induced nuclear reaction. The nuclear transition matrix element to the first excited state of 205Pb can be determined from the one of the bound-state beta decay of 205Tl to this state as the dominant contribution to the nuclear transition matrix is the same.
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