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Nuclear Astrophysics meets Asteroseismology

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Massive stars play an important role in the synthesis of new elements in the Universe. To understand the nucleosynthetic wind-yields of such stars, there are three key-ingredients; the nuclear reaction-rates, internal mixing processes, and the stellar winds. We focus on the effects of interior mixing processes. Up to now, the calculations of stellar yields have relied on stellar evolution models that are uncalibrated in terms of chemical mixing in the stellar interior. We take the recent observationally driven advances in asteroseismic analysis of the interior structure and the proposed mixing profiles based on them into account. This way, our models connect theoretical yield calculations and asteroseismically calibrated mixing profiles. This is a vital step to improve our understanding of the evolution of stars with initial masses within the supernova-range and their role in enriching the galaxy. Due to the strong dependence between the interior structure of a supernova-progenitor and its final fate, changes in the interior mixing of these stars affects the nucleosynthetic yields, and might also affect which stars end as supernovae. Therefore, a proper understanding of the impact of this calibrated mixing on stellar evolution is especially valuable for the community working on nucleosynthesis and galactic chemical evolution.

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