N02a The impact of magnetic fields on the evolution of low metallicity massive stars

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Massive stars, initially higher than 8 solar masses, are important building blocks of galaxies via chemical enrichment and mechanical feedback. In the era of JWST and upcoming facilities with capabilities to probe the early Universe, the theoretical understanding of massive star evolution is essential to correctly interpret observations. Based on the knowledge that magnetic fields crucially impact stellar mass loss and rotation in Galactic massive stars, we extend our recent evolutionary model grid to investigate the interplay between these effects in low metallicity environments ($Z/Z_\odot \sim 10^{-3} - 10^{-6}$). We explore schemes accounting for various scenarios in magnetic braking, chemical mixing, and also in mass loss. The latter one is calculated via a de-coupling limit that could, in principle, lead to no radiatively-driven mass loss all already at $Z/Z_\odot \sim 10^{-5}$. When lowering the metallicity, massive stars are more prone to encounter the limit of critical rotation. However, magnetic fields can mitigate the onset of such instabilities since they aid the spin-down of the star. We show that these complex effects also impact the chemical yields of CNO elements. We conclude that the interplay between various physical processes needs to be scrutinized with the corresponding uncertainties before interpreting, for example, nitrogen abundances in high-redshift galaxies.