Can massive Be/Oe stars be progenitors of long gamma ray bursts?

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Context: The identification of long-gamma-ray-bursts (LGRBs) is still uncertain, although the collapsar engine of fast-rotating massive stars is gaining a strong consensus.
Aims: We propose that low-metallicity Be and Oe stars, which are massive fast rotators, as potential LGRBs progenitors.
Methods: We checked this hypothesis by 1) testing the global specific angular momentum of Oe/Be stars in the ZAMS with the SMC metallicity, 2) comparing the ZAMS ($Omega/Omega_{rm c},M/M_{odot}$) parameters of these stars with the area predicted theoretically for progenitors with metallicity $Z!=!0.002$, and 3) calculating the expected rate of LGRBs/year/galaxy and comparing them with the observed ones. To this end, we determined the ZAMS linear and angular rotational velocities for SMC Be and Oe stars using the observed
vsini parameters, corrected from the underestimation induced by the gravitational darkening effect.
Results: The angular velocities of SMC Oe/Be stars are on average $langleOmega/Omega_{rm c}rangle!=!0.95$ in
the ZAMS. These velocities are in the area theoretically predicted for the LGRBs progenitors. We estimated the yearly rate per galaxy of LGRBs and the number of LGRBs produced in the local Universe up to z=0.2. We have considered that the mass range of LGRB progenitors corresponds to stars hotter than spectral types B0-B1 and used individual beaming angles from 5 to 15degr. We thus obtain $R^{rm pred}_{rm
LGRB}sim10^{-7}$ to $sim10^{-6}$ LGRBs/year/galaxy, which represents on average 2 to 14 LGRB predicted events in the local Universe during the past 11 years. The predicted rates could widely surpass the observed
ones [(0.2-3)$times10^{-7}$ LGRBs/year/galaxy; 8 LGRBs observed in the local Universe during the last 11 years] if the stellar counts were made from the spectral type B1-B2, in accordance with the expected
apparent spectral types of the appropriate massive fast rotators.
Conclusion: We conclude that the massive Be/Oe stars with SMC metallicity could be LGRBs progenitors. Nevertheless,
other SMC O/B stars without emission lines, which have high enough specific angular momentum, can enhance the predicted $R_{rm LGRB}$ rate.

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