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Numerical study of Tidal Disruption Events by the Super Massive Black Hole Sgr A* at the center of the Milky Way

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Abstract

A Super Massive Black Hole (SMBH) known as Sagittarius A* (Sgr A*) lurks in the centre of the Milky Way. With a mass $\sim 4 \times 10^6 M_\odot$ of that of the Sun (1 $M_\odot$) it affects the local stellar systems by the capture of stars, due to its gravitational influence that dominates the surrounding InterStellar Medium (ISM), leading to their disruption through the effects of the gravitational tidal forces. The thermal energy release during the Tidal Disruption Events (TDEs) leads to the emission of X-rays that were observed by the XMM-Newton telescope and also have a major role in the energising of the Fermi Bubbles, which are two symmetric structures

that occur in both planes of the Galactic Center.
This work presents the results of a parametric study of TDEs of a solar type star captured by Sgr A* and the amount of energy released during this phenomenon. The tidal disruption is evaluated in terms of the star trajectory with different penetration parameters (b) and the spatial distribution of the debris is tracked over time in order to determine the fraction of stellar mass that stays bound to the black hole.

Keywords: Tidal Disruption Events, Super Massive Black Hole, Stars

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References

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