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Damping of self-generated Alfvén waves in a partially ionized medium and the grammage of cosmic rays in the proximity of supernova remnants

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- We investigate the escape of CRs from supernova remnants embedded in a partially ionized medium and the self-confinement in the source region, as due to the CR streaming instability.

- If self-confinement is effective, a sizable fraction of the CR grammage could be produced in the source region rather than in the whole time spent by CRs in the Galactic disk, as typically assumed. This would have important implications for the interpretation of quantities such as the B/C ratio, and would require a profound modification of the current paradigm of the Galactic CR transport.

- We solve the 1D CR and Alfvén wave transport equation in the source proximity, taking into account the generation of waves by resonant streaming instability and various damping processes, most notably ion-neutral friction. From that, we estimate the moment of escape of CRs of a given energy from a SNR, their residence time in a region of ~ 100pc around the source, and the corresponding grammage.

- We find that, for the typical environment met in the WNM and WIM phases of the ISM, ion-neutral friction limits the effect of self-confinement and the resulting CR source grammage is negligible compared to that inferred from observations, contrary to what was previously suggested in the literature.