The influence of discrete cosmic ray sources on the secondary to primary ratio

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The recent discovery of direct evidences for the acceleration of high energetic particles at the shell supernova remnant RXJ1713.7-3946 underlined the need to calculate the cosmic ray (CR) distribution in the Galaxy on a spatial grid fine enough to resolve the changes in the CR density due to these kind of objects. To analyze the impact of the discreteness of the CR sources on the CR spectrum and also the secondary to primary ratio, we developed a method that enabled us to calculate the Galactic CR distribution with hight spatial and temporal resolution.

Our calculations for CR hadrons show that the density of the primary CR component varies in space and time, however, the secondary component shows only minor variations, approaching the steady state distribution. These findings imply that the secondary to primary ratio, which is widely used to determine the parameters of CR propagation models is also changing with space and time. In particular, we expect a decrease of the ratio in the vicinity of an active source.