

Project Title:

Supernova remnants: from the explosion to the interstellar medium

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<p>1. Background and purpose of the project, relationship of the project with other projects</p> <p>This project is about supernova remnants (SNRs), which are the final stage of evolution of some stars, and as such are key in the cycle of matter in the Galaxy. The aim is to reveal the mechanisms that shape SNRs, from their generation in a supernova explosion to their dilution in the interstellar medium. I want to elucidate how different explosion engines produce different SNRs, and how SNRs interact with their environment – and how these effects play together. This study requires the use of 3-dimensional simulations to properly reproduce the SNR geometry.</p> <p>This project is complementary with other research done in my former laboratory, the Astrophysical Big Bang Laboratory, on SNRs and more generally on explosive phenomena.</p> <p>2. Specific usage status of the system and calculation method</p> <p>The main point of the project is to use realistic supernova models in 3D (obtained from colleagues in Germany and in Japan) as inputs for my own SNR simulations.</p> <p>3. Result</p> <p>In this years-long project we have shown how the imprint of the SN can be seen on the young SNR, and started to explore the different remnants that can be produced by different explosion models.</p>	<p>4. Conclusion</p> <p>The project of making the link between supernova studies and remnant studies has been overall successful.</p> <p>5. Schedule and prospect for the future</p> <p>The project can be pursued along two axes, refining existing models, and trying new kinds of models. We made the first simulations from the SN to the SNR for a challenger explosion model called D6, in collaboration with a Japanese researcher from the U. of Tokyo. We plan to keep investigating this model, with a more complete exploration of the parameter space.</p> <p>A computer like Hokusai will be useful in particular to increase the spatial resolution, up to 1024^3.</p> <p>6. If no job was executed, specify the reason.</p> <p>I haven't used the machine much this year as I was navigating a change of employment, from Research Scientist to Visiting Scientist, with a move from Japan to Canada. The period covered by the report is only effectively from July to November 2023, during which I didn't run big simulations.</p>
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