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Perspectives for high-resolution spectroscopy with Athena X-IFU

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The Athena X-ray observatory is a L-class mission selected by ESA in its Cosmic Vision program to be launched in early 2030s. Successor of the XMM-Newton telescope, it will embark a revolutionary spectro-imager X-IFU using micro-calorimeter technologies allowing a breakthrough 2.5 eV spectral resolution compared to ~150 eV for XMM-Newton.

In this contribution I will review the science cases that X-IFU will address for the science of supernovae and their remnants. I will cover topics such as SN nucleosynthesis, what the remnant can tell us about the SN, and particle acceleration.

I will also discuss the challenges that we will face to analyse the high-resolution data from X-IFU, lay out some technical solutions that we are exploring and in a perspective approach explore the skills that are lacking in the french high-energy community to deal with those issues.

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