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Gaia RVS spectroscopy: do you really know it? (invited talk)

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In June 2022, the Gaia Data Release 3, completing the previous EDR3, made possible a 3D kinematical and dynamical analysis of 33 million stars in the Milky Way and its satellites. In addition, Gaia DR3 has opened a new era of all-sky chemo-physical analysis of stellar populations thanks to the nearly 5.6 million stars observed by the Radial Velocity Spectrometer and parameterized by the GSP-Spec module. This all-sky Gaia chemo-dynamical cartography allows a powerful and precise view of the Milky Way with unprecedented spatial coverage, statistical robustness and spectral fidelity. The RVS spectrographe, with a resolution of 11 500, is enabling a stellar parametrization of quality comparable to ground-based surveys of higher spectral resolution and wavelength coverage. In this talk I will discuss the reasons of the Gaia RVS spectral fidelity, unexpected for a large part of the scientific community, and the different advantages of a space spectroscopic survey like Gaia. In addition, the RVS performances in chemo-physical parametrization will be presented through several scientific examples, including heavy element abundances, comparisons with asteroseismic surveys, the detailed characterization of stellar evolutionary phases and Milky Way astrophysics. The Gaia chemical constraints on our understanding of Milky Way's nature and nurture evolution, will be particularly highlighted.

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