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Deep learning for spectral perfectionism

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Faithful reconstruction of the original spectral information is a long-standing yet unachieved goal in the science of spectroscopic data treatment, essential to several scientific cases in cosmology, fundamental physics, and stellar astrophysics. Data reduction in particular has still failed to implement on a large scale what is demonstrably the best approach to spectral extraction, namely the "spectro-perfectionist" (SP) method. I will talk about our project to remove this bottleneck by implementing the first full-SP tool for a super-stable spectrograph, HARPS. The project will take advantage of recent technological improvements (e.g. in GPUs) and novel solutions to model the instrumental PSF based on deep learning. The results will lead to similar tools for other state-of-the-art spectrographs, like ESPRESSO on the Very Large Telescope and future ANDES spectrograph for the Extremely Large Telescope.

Primary author: MILAKOVIC, Dinko (INAF OA Trieste)

Presenter: MILAKOVIC, Dinko (INAF OA Trieste)

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