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The remote sensing community has a long history of developing methods to fuse high spatial resolution information from panchromatic sensors with the spectrally diverse information, but generally of lower spatial resolution, from spectral sensors. However, these methods have typically had as their primary motivation the creation of color imagery of high visual quality for visual interpretation. These methods do not in general seek to preserve the quantitative spectral information in the data and can sacrifice the radiometric fidelity of the spectral sensor. This presentation will describe current work in the area of spectrally accurate spatial resolution enhancement of hyperspectral imagery, with a goal of ensuring good performance from spectral exploitation algorithms such as target detection. A new algorithm based on a learning framework for MSI - HSI fusion will be presented which leverages unique loss functions to achieve both spatial and spectral accuracy in the sharpened product. Experimental results will be shown for several hyperspectral experimental collections. (Received September 15, 2020)