Abstract: While there have been dramatic advances in the past decade in spectral-imaging technologies, the amount of data produced can be prohibitively large for storage, transmission, and analysis. In many applications (e.g., persistent surveillance and thematic classification), the relevant spatio-spectral information present in a spectral image that can be used in answering questions about the scene constitutes a very small fraction of the total information present in the image. Rather than sensing enormous amounts of spatio-spectral data and analyzing it to answer application-specific questions, as traditionally done, in this colloquium we will review concepts that exploit the course, electrical tunability of certain spectral sensors, in conjunction with data-driven algorithms, to develop front-end, computational spectral imaging methods that sense only the spatio-spectral information that is relevant to an application of interest. The front-end computations are minimal, and they can be performed on the sensor.