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(54) Title: SPECTROMETER AND METHOD OF DETECTING AN ELECTROMAGNETIC (EM) WAVE SPECTRUM

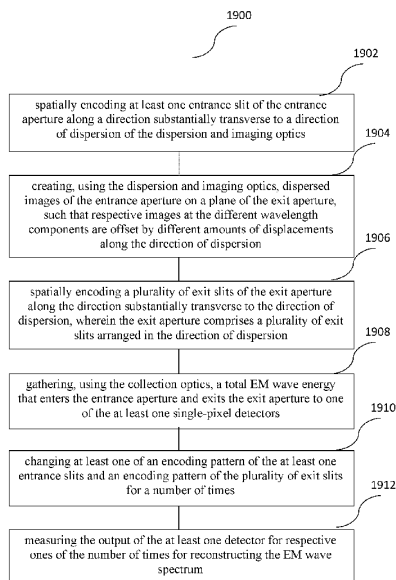


Figure 19

(57) Abstract: A spectrometer for detecting an electromagnetic (EM) wave spectrum having one or more wavelength components within a spectral band of interest, and a method of detecting an electromagnetic (EM) wave spectrum having one or more wavelength components within a spectral band of interest. The method uses an entrance aperture; a dispersion and imaging optics containing at least one dispersion element; an exit aperture; a collection optics; and at least one single-pixel detector, each single-pixel detector sensitive to one or more of the wavelength components; and the method comprises the steps of spatially encoding at least one entrance slit of the entrance aperture along a direction substantially transverse to a direction of dispersion of the dispersion and imaging optics; creating, using the dispersion and imaging optics, dispersed images of the entrance aperture on a plane of the exit aperture, such that respective images at the different wavelength components are offset by different amounts of displacements along the direction of dispersion; spatially encoding a plurality of exit slits of the exit aperture along the direction substantially transverse to the direction of dispersion, wherein the exit aperture comprises a plurality of exit slits arranged in the direction of dispersion; gathering, using the collection optics, a total EM wave energy that enters the entrance aperture and exits the exit aperture to one of the at least one single-pixel detectors; changing at least one of an encoding pattern of the at least one entrance slits and an encoding pattern of the plurality of exit slits for a number of times; and measuring the output of the at least one detector for respective ones of the number of times for reconstructing the EM wave spectrum.

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