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Designing Achromatic Beams with Interferometry

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A well known problem in astronomical spectroscopy of confused sources comes from achromaticity (the wavelength dependence) of the spatial beams of the spectrograph. This achromaticity aliases spatial structure into spectral structure. One cannot completely separate spatial from spectral because of achromaticity. It is shown that if one has multiple overlapping beams one can synthesize beams which have much less achromaticity than the originals, allowing one to greatly reduce the uncertainty in the spectra of individual sources. A formalism for optimally synthesizing beams is presented. Since intensity mapping by definition is looking at confused sources this formalism should have wide applicability in this field.

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