

Maximum angular size sensitivity of an interferometer

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Let us assume a circularly symmetric Gaussian source of FWHM θ , i.e. with a brightness distribution

$$\exp \left\{ -4 \ln 2 \left(\frac{x}{\theta} \right)^2 \right\}.$$

The normalized source visibility, given by the Fourier Transform of the brightness distribution, is

$$\exp \left\{ -\ln 2 \left(\frac{u_\lambda}{2 \ln 2 / \pi \theta} \right)^2 \right\},$$

where the projected baseline u_λ is measured in wavelengths. The source visibility goes to half intensity for a projected baseline u_λ^m given by

$$u_\lambda^m \theta = 2 \ln 2 / \pi.$$

This can be considered as the minimum interferometer baseline necessary to be sensitive to a source of angular size θ .

Or, the other way around, if the minimum baseline of an interferometer is u_λ^m , the maximum angular size to which the interferometer is sensitive is given by θ . In practical units,

$$\left[\frac{u_\lambda^m}{k\lambda} \right] \left[\frac{\theta}{\text{arcsec}} \right] = 91.0.$$