Measurement of Polarization Angle in RM Synthesis

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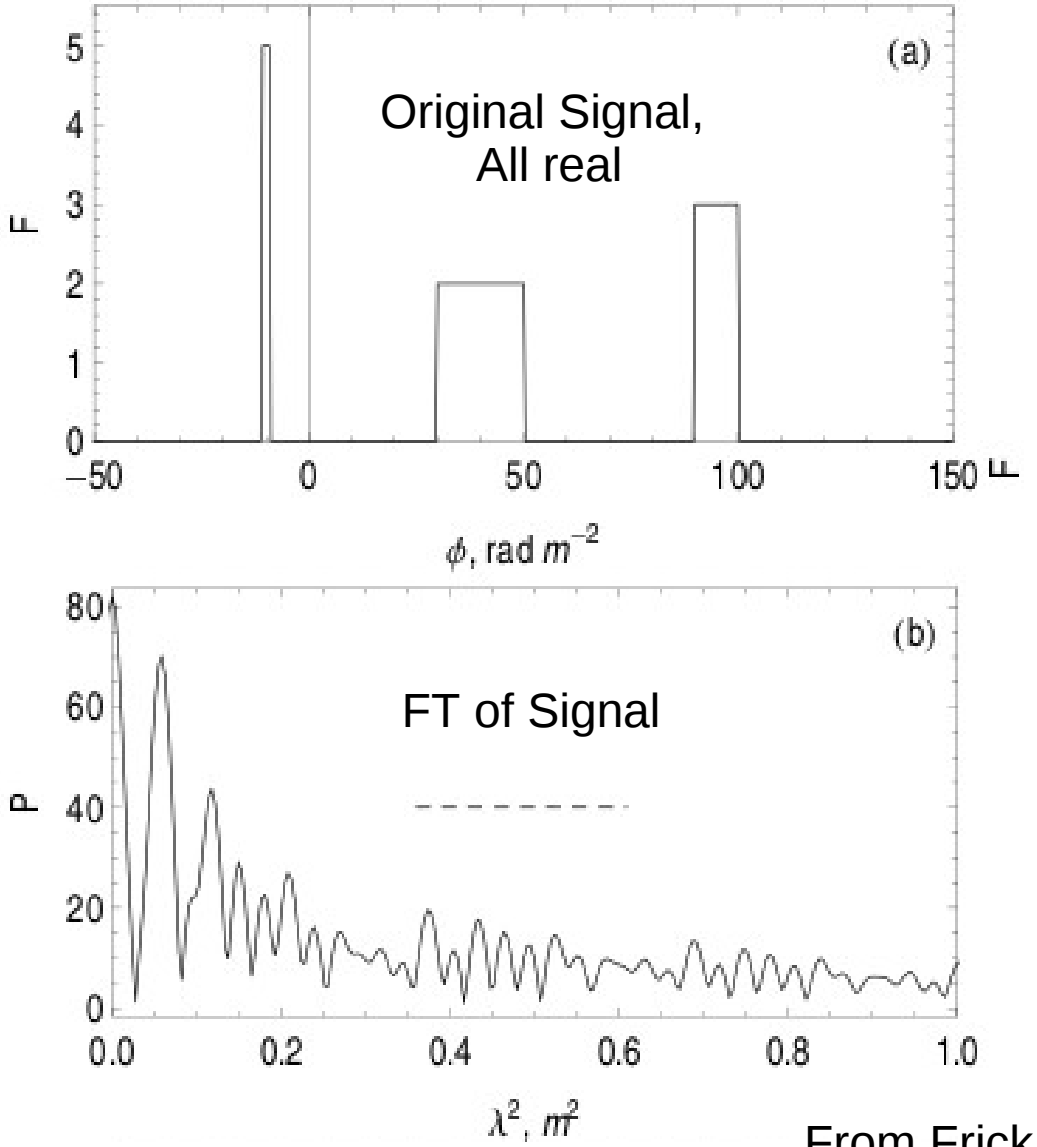
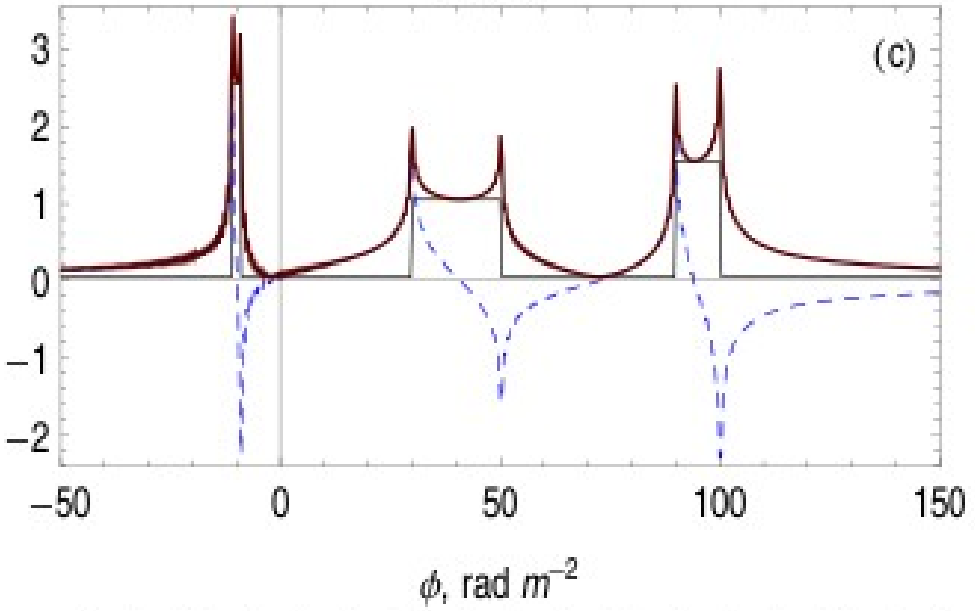
MPA

$$F(l, m, \phi) = pIe^{2i\chi_0}$$

$$\chi = \phi\lambda^2$$

$$P(l, m, \lambda^2) = \int d\phi \; pIe^{2i\chi_0} e^{-2i\phi\lambda^2}$$





Signal as reconstructed using $\lambda^2 > 0$,
No longer all real

From Frick et al. (2010)

NOTATION: $f(x) = FTn[F(k)] \rightarrow$ n dim. Fourier Transform of F is f

Some relevant properties of FTs

If F(k) is real:

$f(-x) = f^*(x)$

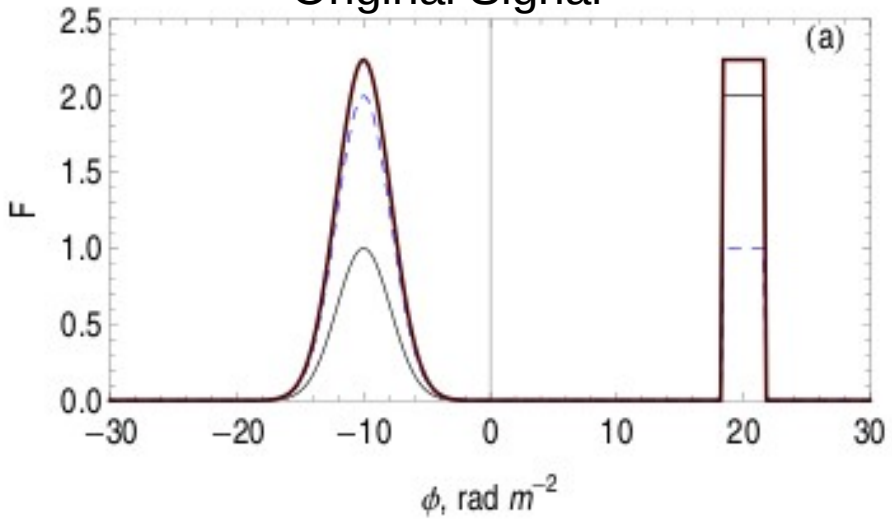
$Re[f(-x)] + i\, Im[f(-x)] = Re[f(x)] - i\, Im[f(x)]$

i.e. Re(f) is symmetric & Im(f) is anti-symmetric

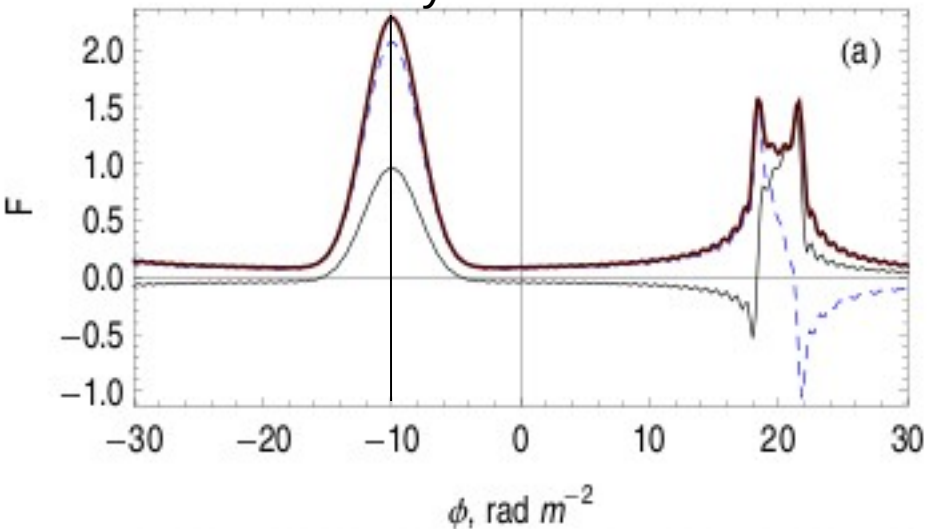
If F(k) is real and symmetric:

f(x) is also real and symmetric

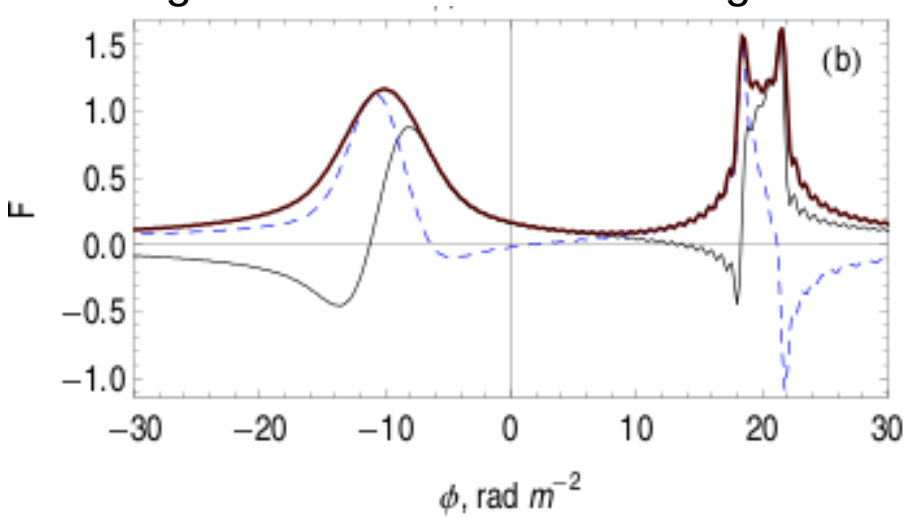
Original Signal

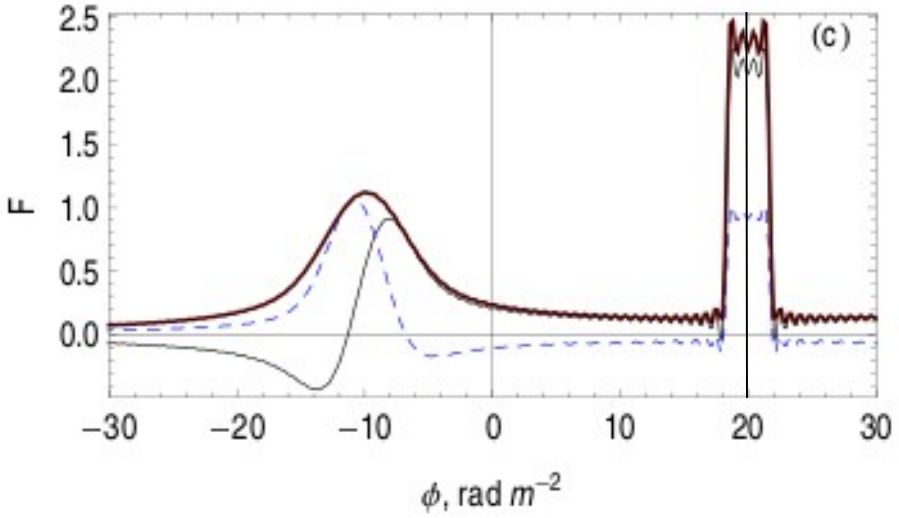


Signals as reconstructed assuming F is symmetric



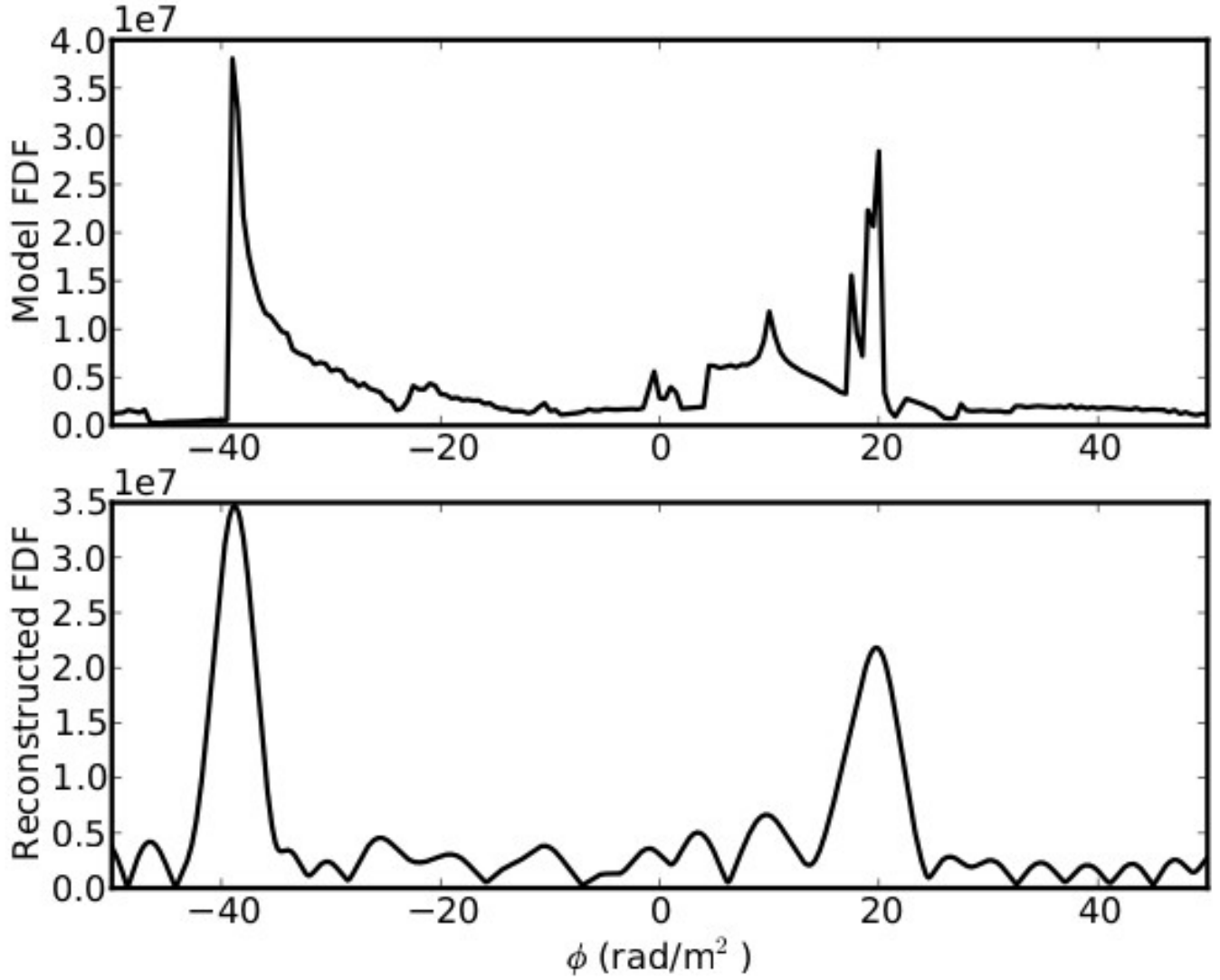
Signal as reconstructed using $\lambda^2 > 0$





From Frick et al. (2010)

e.g. Faraday Caustics



Bell, Junklewitz, & Enßlin, arXiv:1105.2693