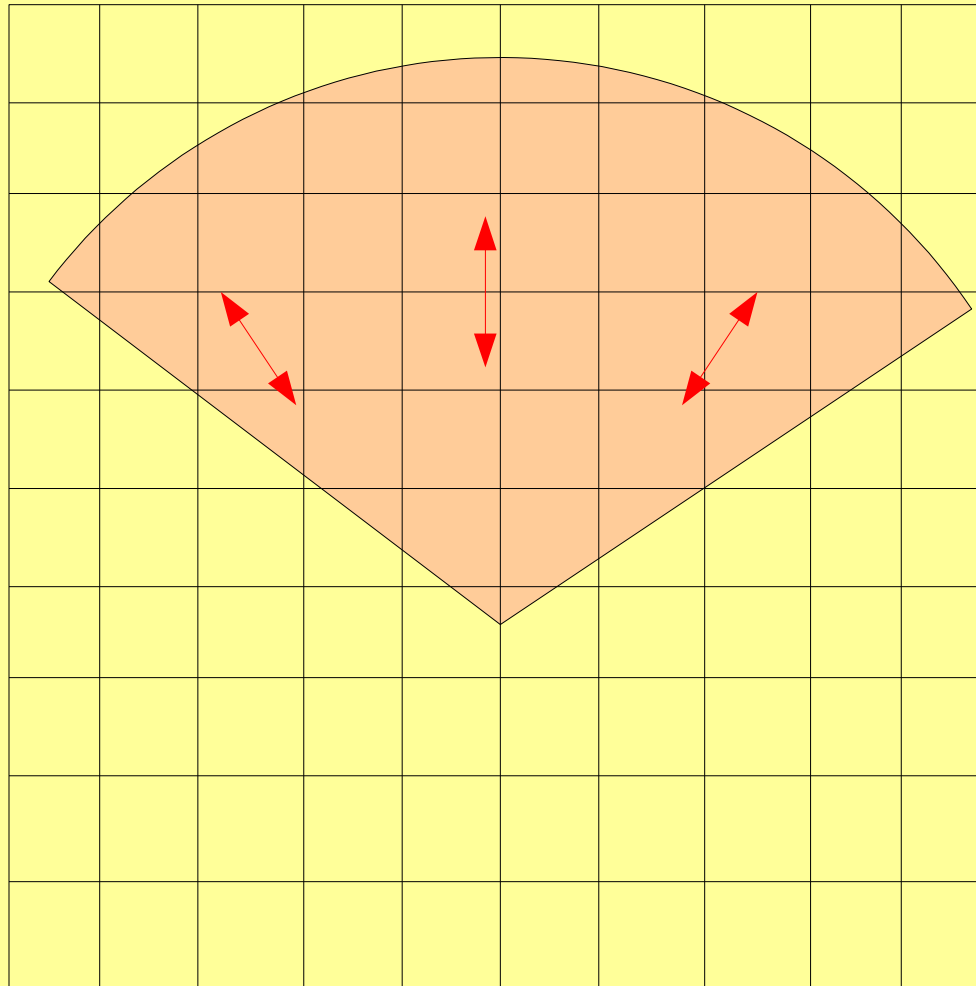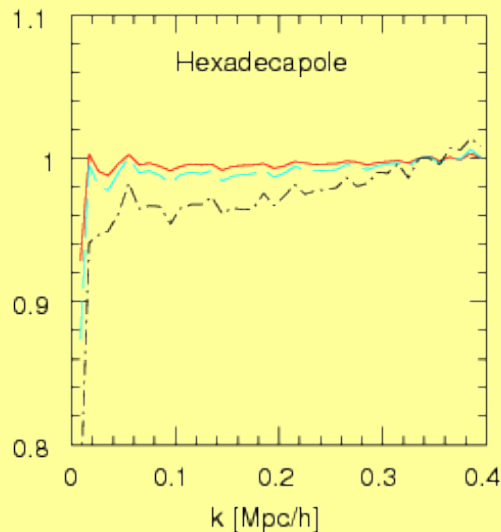# How wide angle of survey geometry affects

Usual Fourier Transformation

Wide angle effect on "2D-Power"
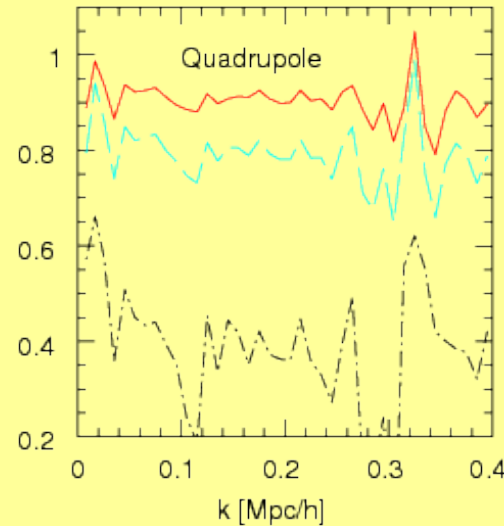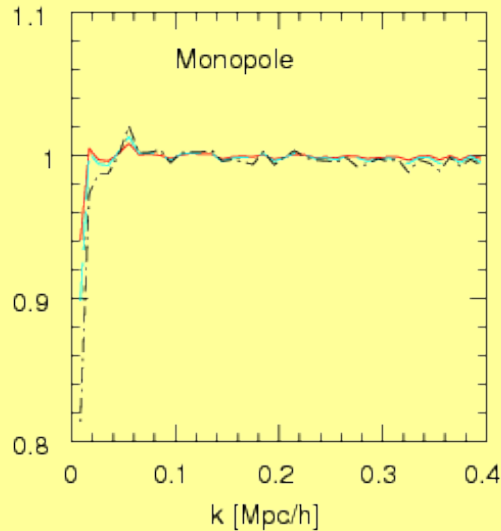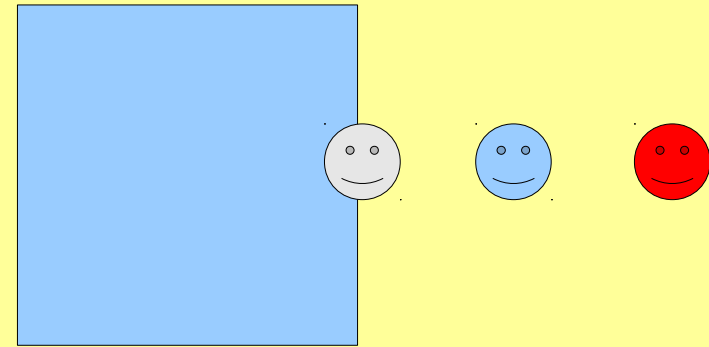
- ✔ Unlike 2PCF, naive FFT introduces "global coordinate" which does not relate to line-of-sight direction.

  - ✔ Wide angle effect will appear at all scale.

- ✔ First of all, we cannot define "power spectrum" for inhomogeneous field!

Power Spectrum in Redshift Space?

$$\langle \delta(\boldsymbol{k}) \delta^*(\boldsymbol{k'}) \rangle \equiv (2\pi)^3 \delta^K_{\boldsymbol{k}, \boldsymbol{k'}} P(\boldsymbol{k})$$

Random field is homogeneous

- Real Space
  - Isotropic & homogeneous
- Distant Observer Approximation
  - Anisotropic & homogeneous
  - We can define power spectrum. The power spectrum will be anisotropic.
- Real Redshift Space
  - Isotropic & inhomogeneous
  - We cannot define power spectrum.

Configuration Space

- No problem as for wide angle effect
  - Natural description of "line-of-sight" for each pairs
  - Theoretical methods for calculating 2PCF in wide angle are prepared.
    - Matsubara 2004, Szapudi 2004, ⋯
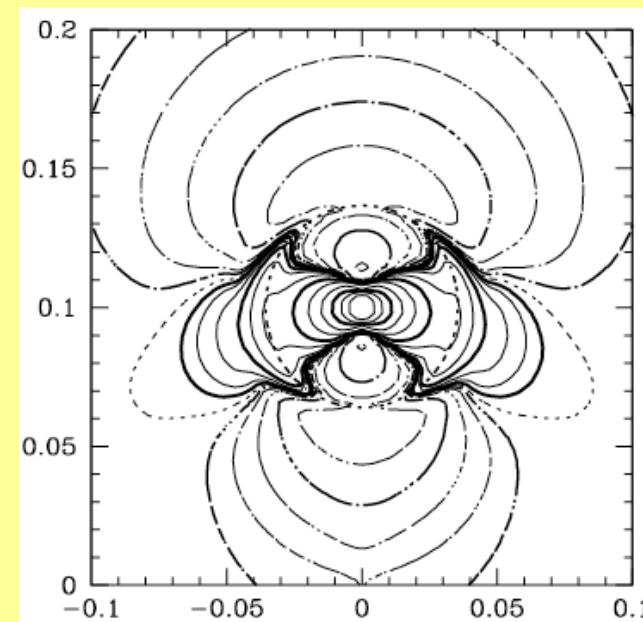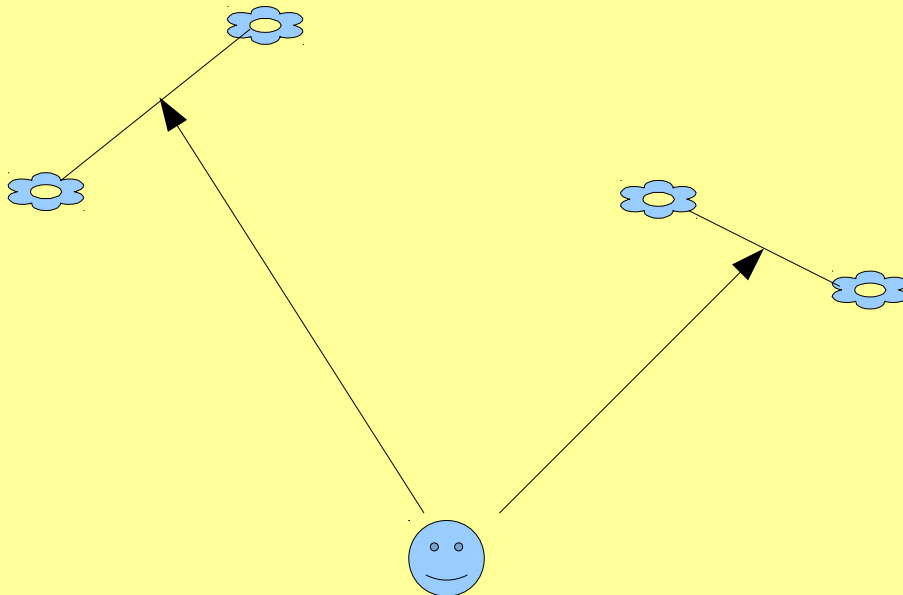
Fourier Space

- ✔ **Subsamples with small angle**

    (e.g., Cole et al. 1994, ···, Sato et al. 2011)

    - ✔ Loss of large scale modes

- ✔ **Multipole weighting**

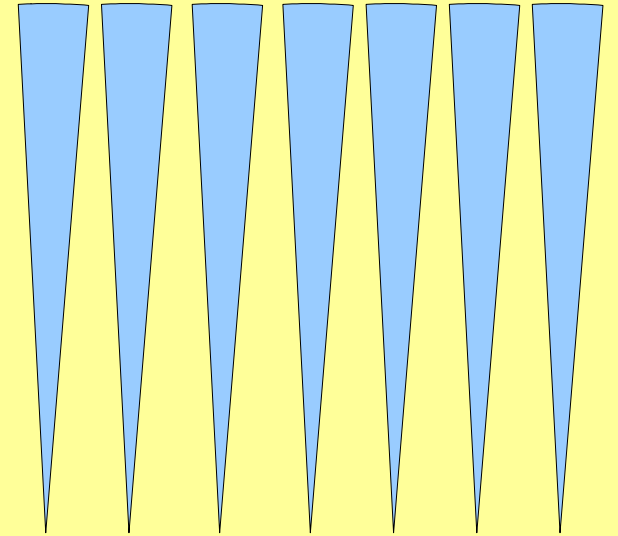   Yamamoto et al. 2006

    - ✔ Most of the problem by wide angle
      is solved, but still it requires distant observer

- ✔ **Alternative**

    - ✔ Expand the field using basis on spherical
      coordinates, and convert to Fourier space.

        (e.g., Heavens & Taylor 1995, Vogeley & Szalay 1996, Tegmark et al. 1998)

    - ✔ The conversion requires a model of redshift dist.

How should we do?