Annual Report

Michał Chodorowski

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On the Shoulders of Giants

Newton:
If I have seen further
it is by standing on the shoulders of Giants"

Newton $\rightarrow$ Einstein $\rightarrow$ James Peebles $\rightarrow$ late Roman Juszkiewicz

My Giant: Chandrasekhar

A couple of papers as a coauthor

Giant's full name

Full name: Chandra-Shekhar Saraf

My graduate student

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Chandra-Shekhar Saraf, Paweł Bielewicz, Michał Chodorowski

Physicist's cavalier approach to mathematics

- $$\int_1 \int_2 = \int_2 \int_1$$

- $$\frac{d}{dr} \int \mathrm{d}k \; f(k,r) = \int \mathrm{d}k \; \frac{\partial}{\partial r} f(k,r)$$

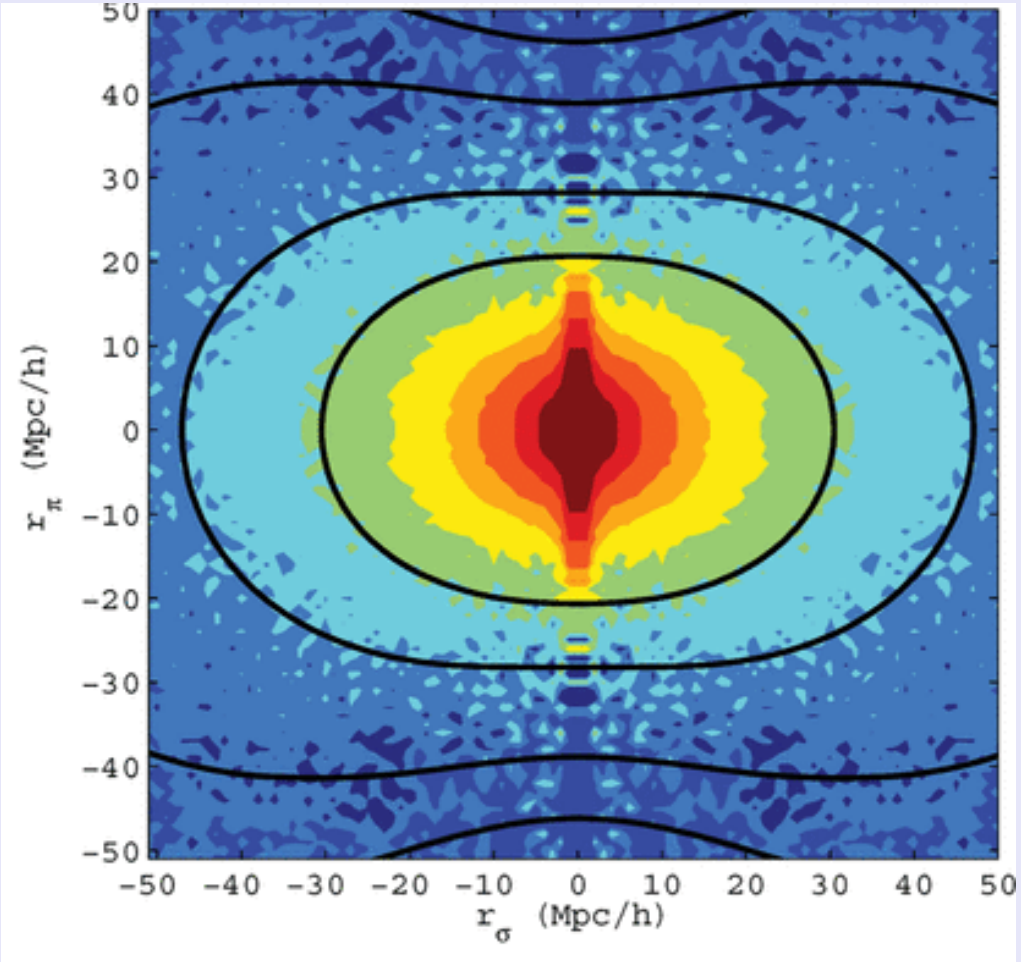
- $$\frac{d}{dr} \mathit{IFT}[\tilde{g}(k)] = \int \frac{d}{dr} \exp[-\mathrm{I}\, k\, r]\, [\tilde{g}(k)]\, \mathrm{d}k$$

Nonlinear correlation function of cosmic density fluctuations

- Integrals for the correlation function diverge
- Even for the-lowest-order non-linear contributions
- I showed that this effect is due to improper usage of the Fourier transform and demonstrated how to overcome this problem
- Divergence-free form of the correlation function
- Not only $\xi(r)_L^2$ but also its derivatives
- Physical problems sometimes require less cavalier and more rigorous approach to mathematics

Correlation function of galaxies in the BOSS spectroscopic survey

CF of BOSS galaxies



Redshift distortions of galaxy clustering

- Present in spectroscopic 3-D surveys of galaxy distribution
- Galaxy motions relative to the uniform Hubble flow
- Redshift is a biased estimator of distance
- We calculated the redshift-space CF in the Zeldovich approximation

Redshift distortions of galaxy clustering

- Exact dynamics: in general problem not tractable
- Approximation to an exact dynamics correction

Shubadip Bera