

IAU SYMPOSIUM 308

“The Zel'dovich Universe”

SUMMARY

Peter Coles (Sussex)
@telescoper

20.06-13.07 KAUBAMAJAS
SUUR ALLAHINDLUS!

OMG!

WOW!

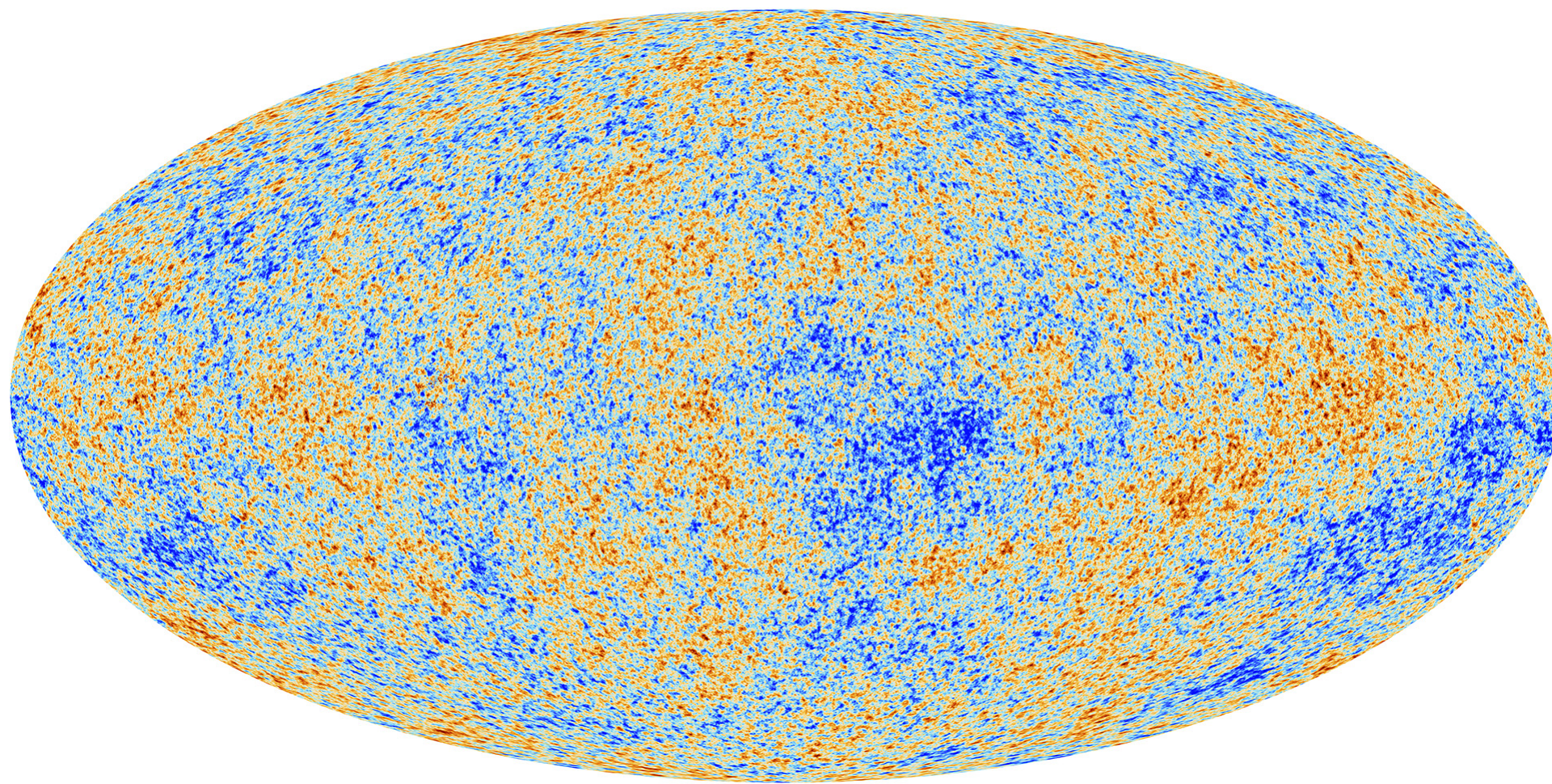
SAH!





- Carr, B. J., and S. Ikeuchi, 1985, *Mon. Not. R. Astron. Soc.* **213**, 497.
- Centrella, J., and A. L. Melott, 1983, *Nature (London)* **305**, 196.
- Centrella, J. M., J. S. Gallagher, A. L. Melott, and H. A. Bus-house, 1988, *Astrophys. J.* **333**, 24.
- Coles, P., 1986, *Mon. Not. R. Astron. Soc.* **222**, 9p.
- Couchman, H. M. P., 1987, *Mon. Not. R. Astron. Soc.* **225**, 777.
- Cowsik, R., and J. McClelland, 1973, *Astrophys. J.* **180**, 7.

NO ORDINARY COSMOLOGY MEETING



The Elephant in the Room



BICEP2



The Meaning of Inflation (OED)

1. The action of inflating or distending with air or gas
2. The condition of being inflated with air or gas, or being distended or swollen as if with air
3. The condition of being puffed up with vanity, pride or baseless notions
4. The quality of language or style when it is swollen with big or pompous words; turgidity, bombast

Oxford Crossword Dictionary
Oxford English Dictionary
Oxford Thesaurus
Oxford English Dictionary
Oxford Dictionary & Thesaurus
Oxford Dictionary & Thesaurus
Oxford English Dictionary
Oxford English Dictionary
Oxford English Dictionary

oxford

[Stack of papers]

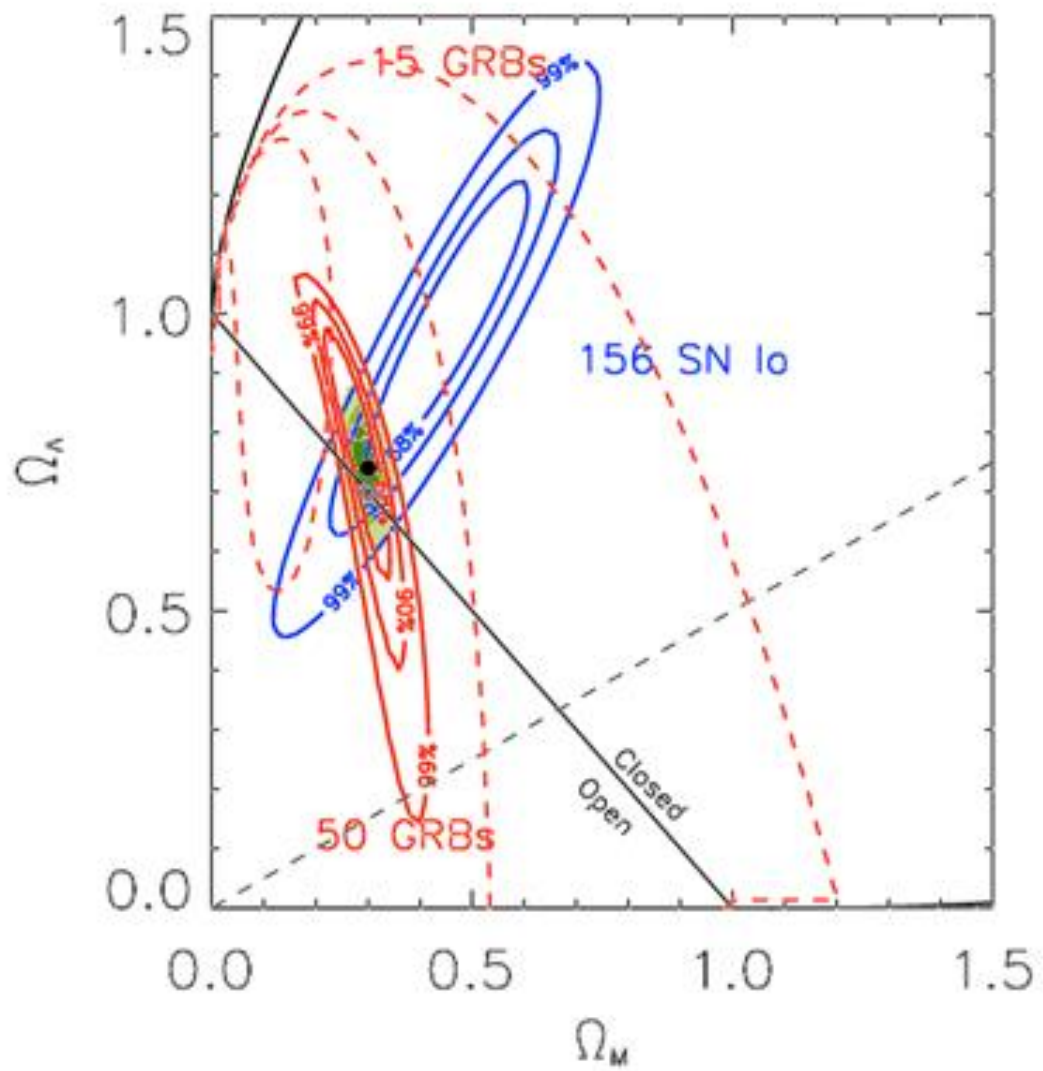
[Blue folder]

[Paper with text]

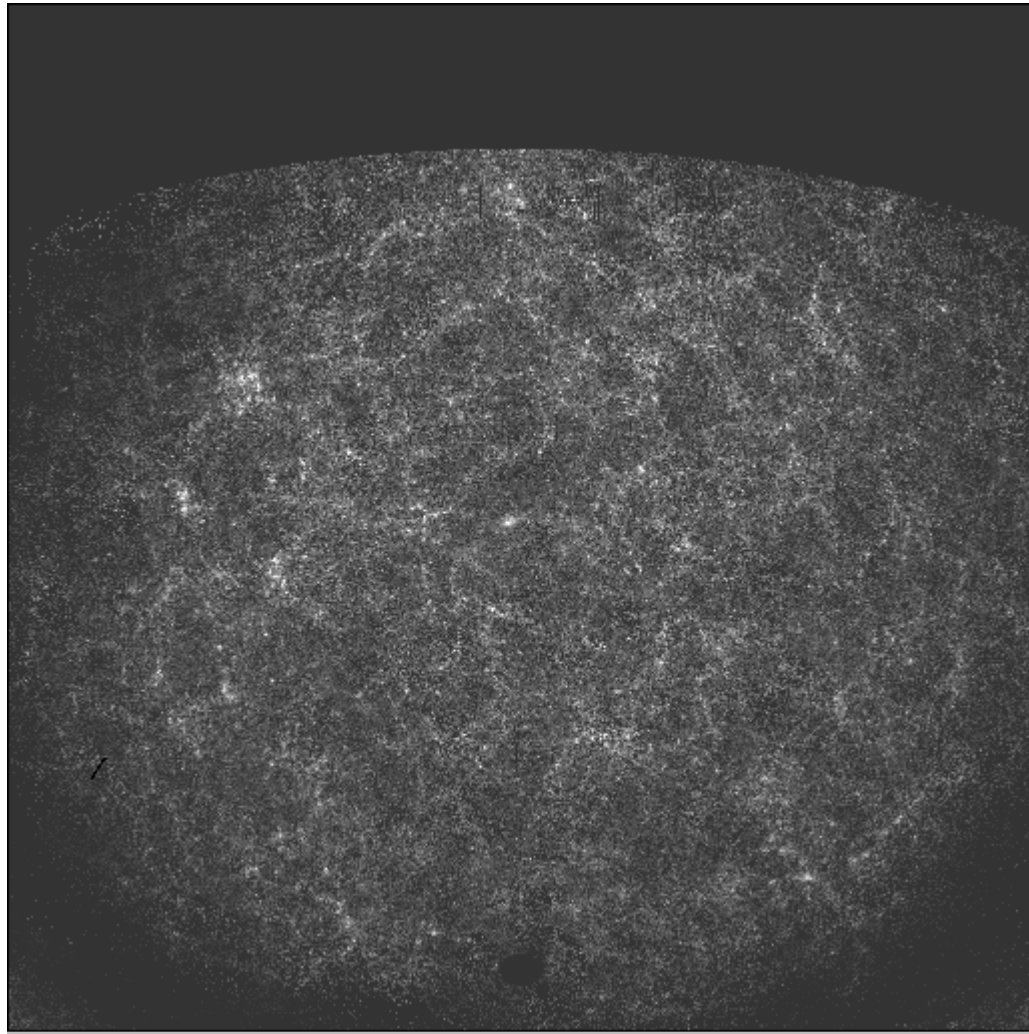


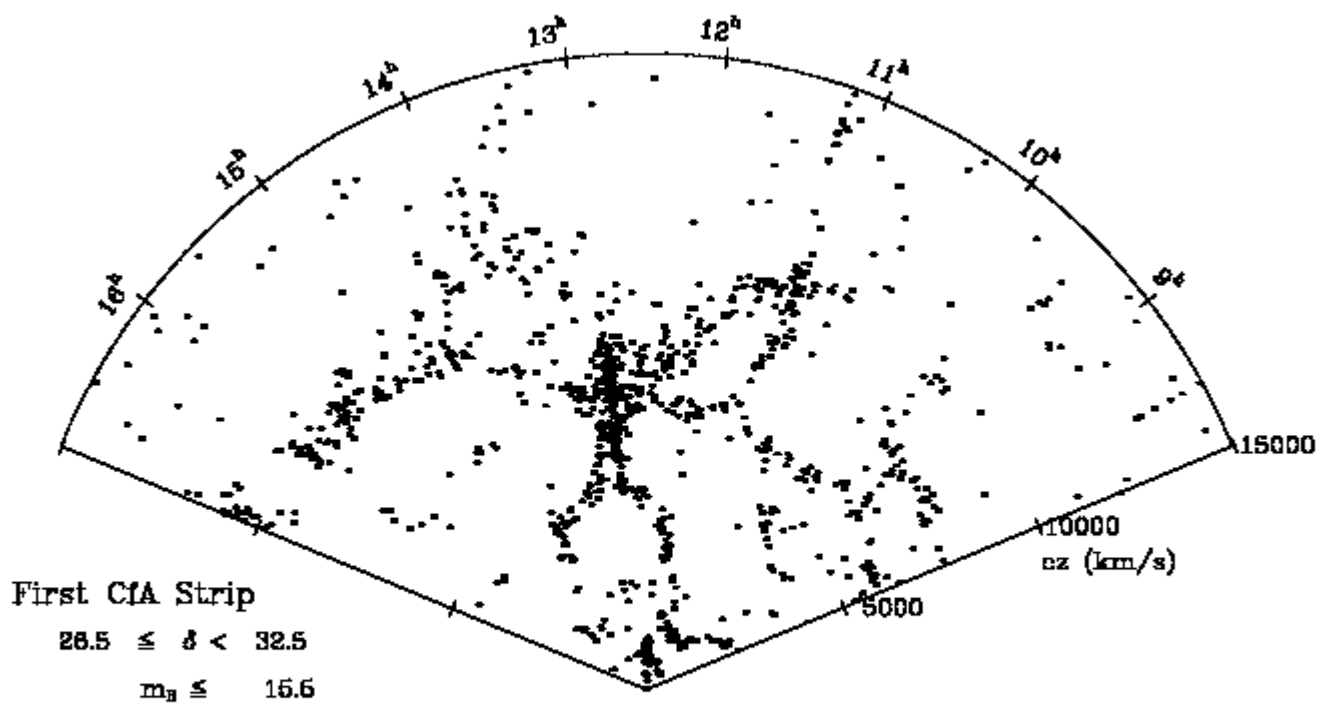
The Meaning of Simulation (OED)

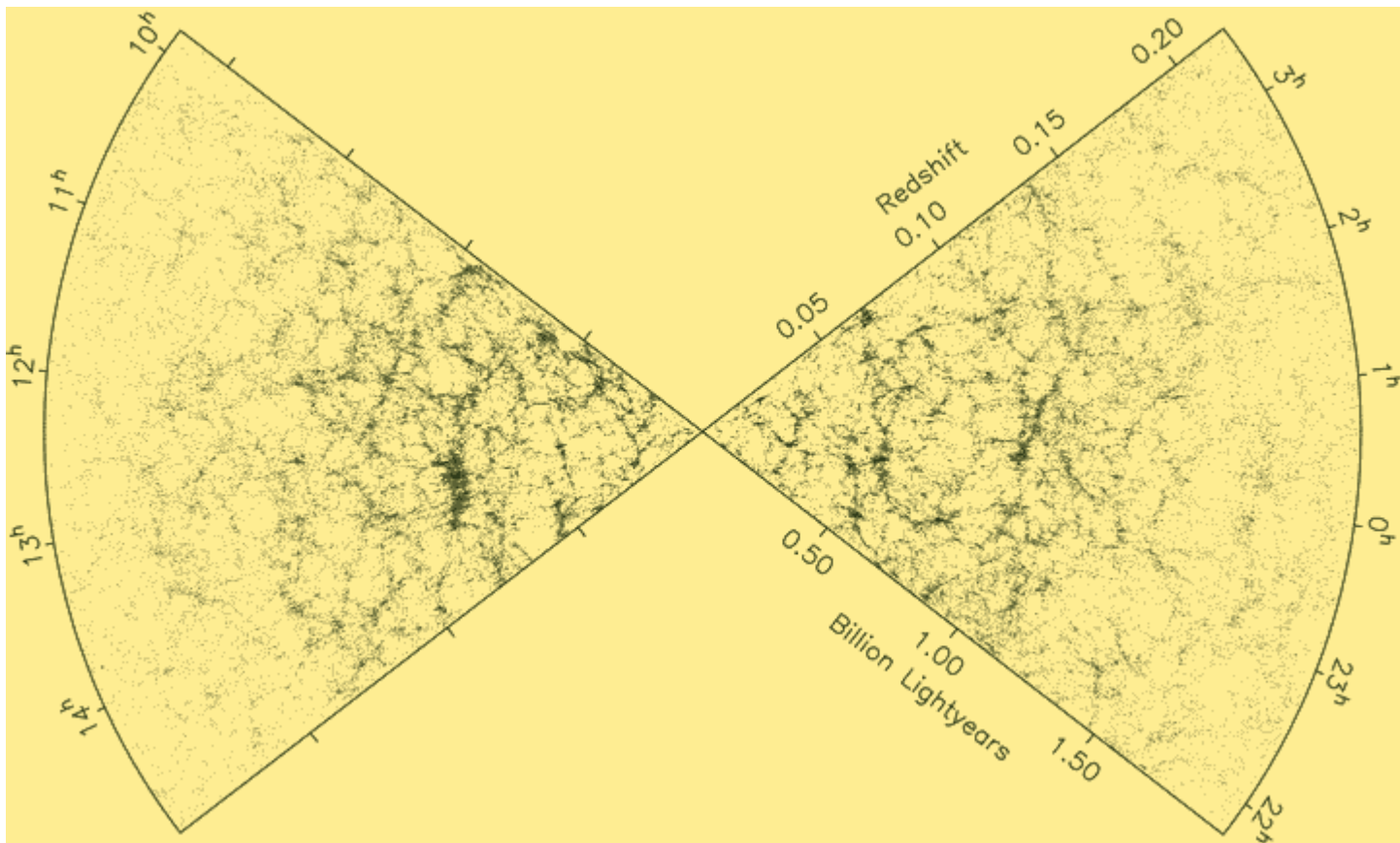
- 1.a. The action or practice of simulating, with intent to deceive; false pretence, deceitful profession.
- b. Tendency to assume a form resembling that of something else; unconscious imitation.
2. A false assumption or display, a surface resemblance or imitation, of something.
3. The technique of imitating the behaviour of some situation or process (whether economic, military, mechanical, etc.) by means of a suitably analogous situation or apparatus, esp. for the purpose of study or personnel training.

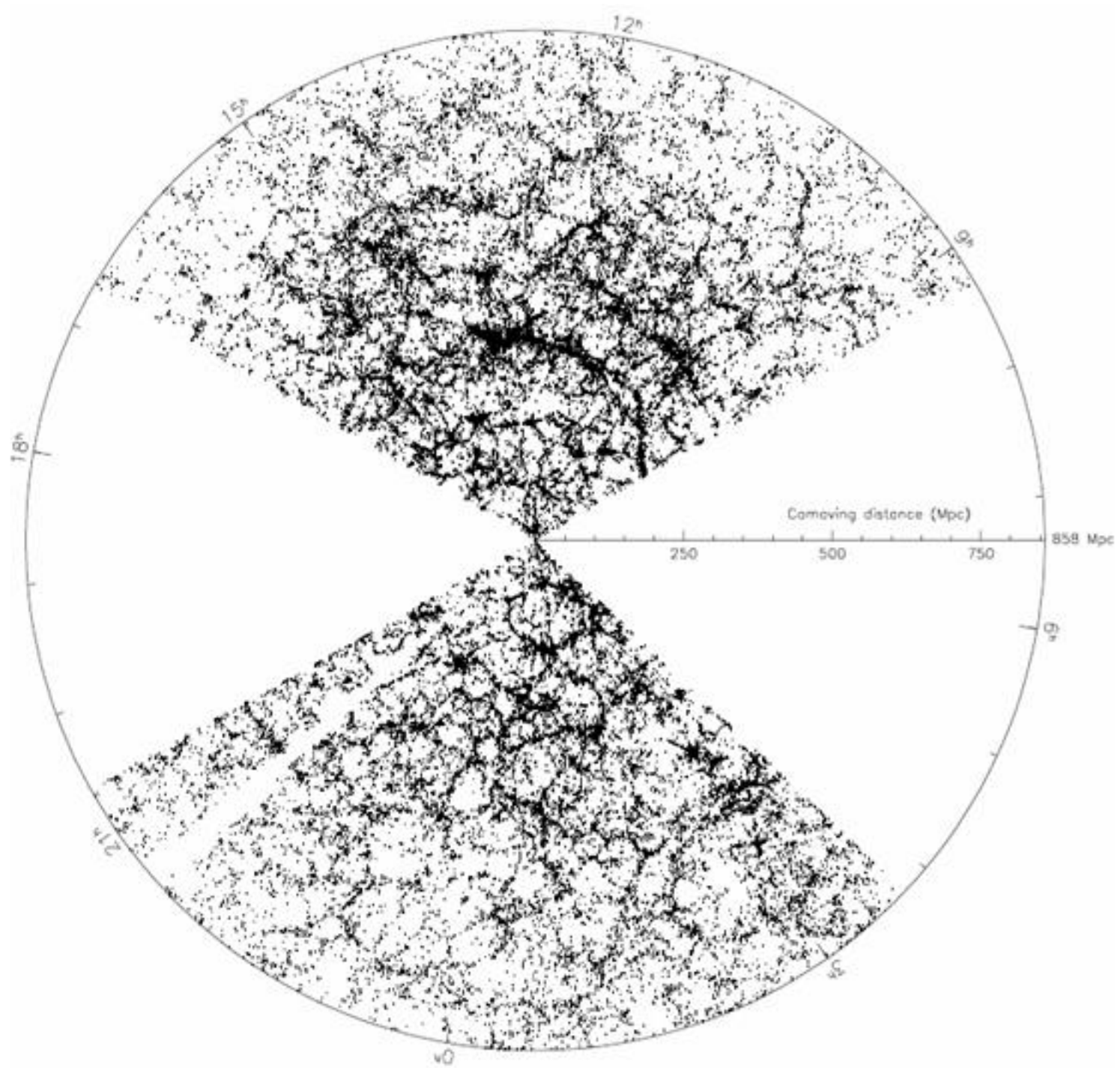


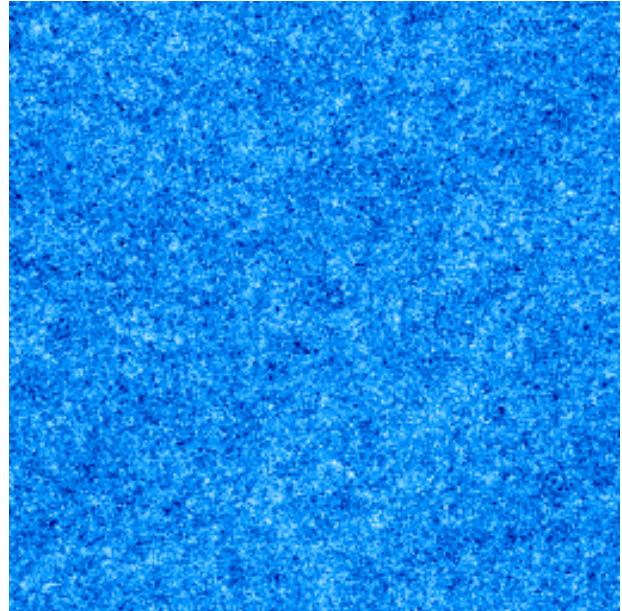
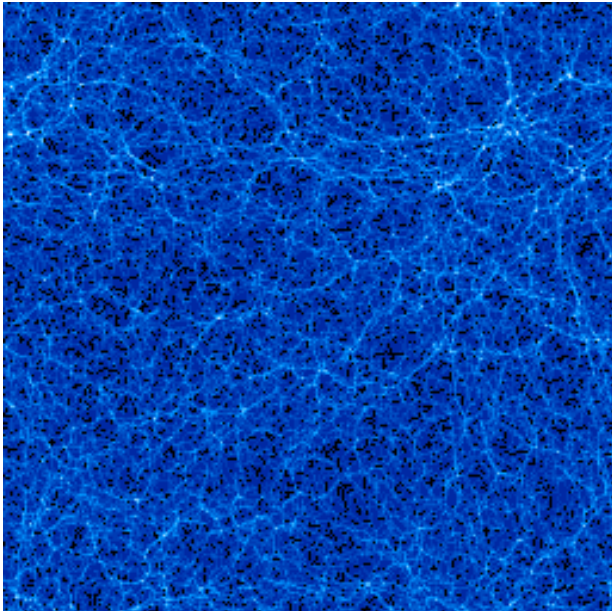
THE COSMIC WEB











MUCH ADO ABOUT
NOTHING

“He hath indeed better bettered
expectation than you must expect
of me to tell you how”

W. Shakespeare, from *Much Ado About
Nothing*

The hierarchy of correlation functions and its relation to other measures of galaxy clustering

Simon D. M. White *Astronomy Department, University of California, Berkeley, California 94720, USA*

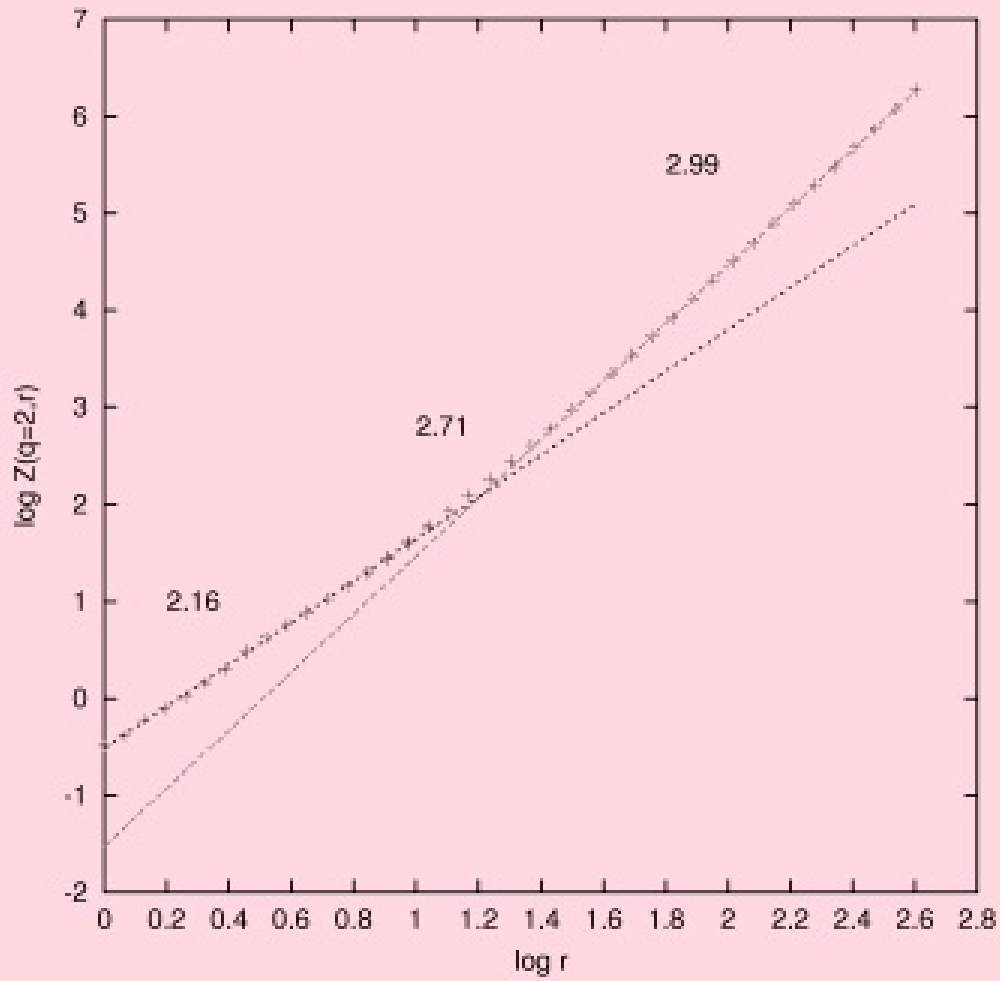
Received 1978 June 22; in original form 1978 April 12

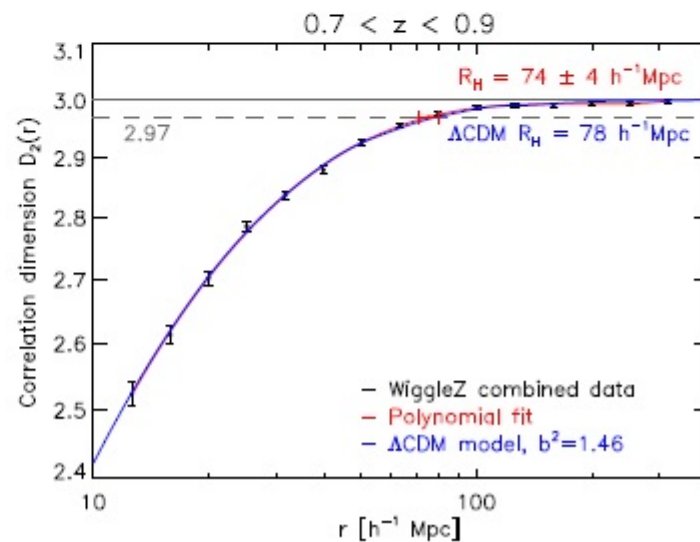
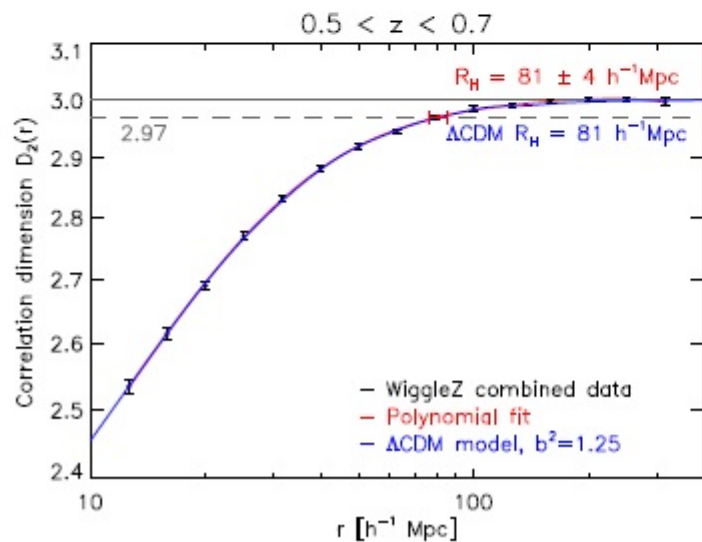
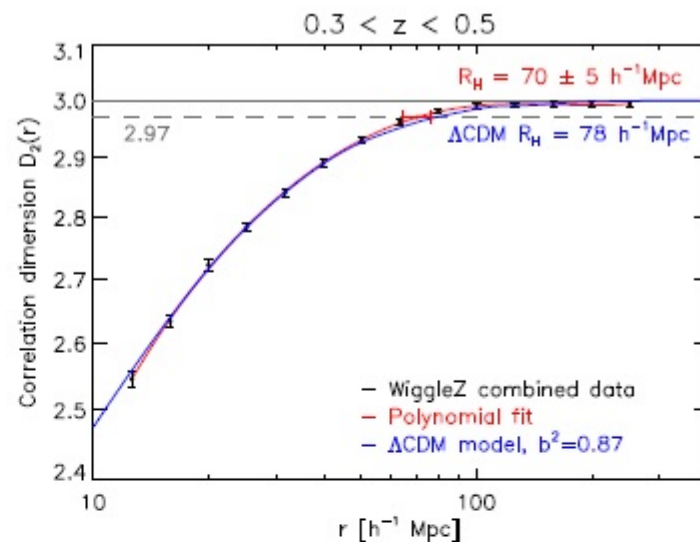
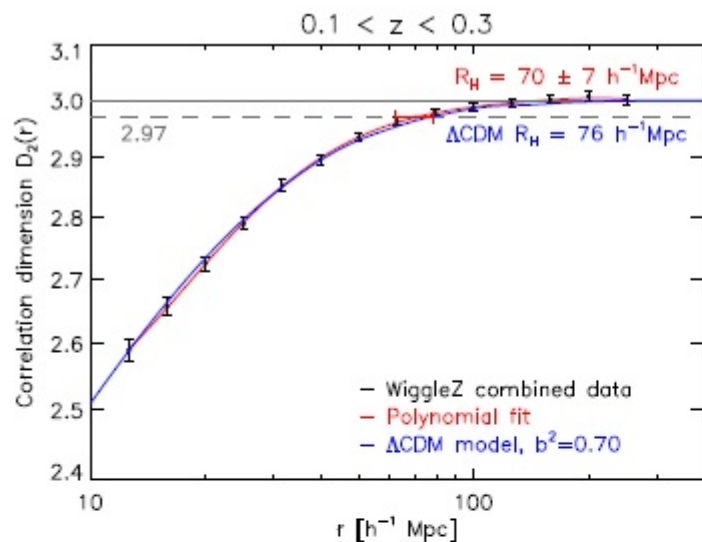
Summary. We derive and display relations which can be used to express many quantitative measures of clustering in terms of the hierarchy of correlation functions. The convergence rate and asymptotic behaviour of the integral series which usually result is explored as far as possible using the observed low-order galaxy correlation functions. On scales less than the expected nearest neighbour distance most clustering measures are influenced only by the lowest order correlation functions. On all larger scales their behaviour, in general, depends significantly on correlations of high order and cannot be approximated using the low-order functions. Bhavsar's observed relation between density enhancement and the fraction of galaxies included in clusters is modelled and is shown to be only weakly dependent on high-order correlations over most of its range. The probability that a randomly placed region of given volume be empty is discussed as a particularly simple and appealing example of a statistic which is strongly influenced by correlations of all orders, and it is shown that this probability may obey a scaling law which will allow a test of the small-scale form of high-order correlations.

1 Introduction

The use of correlation functions to describe galaxy clustering has become widespread in recent years both in theoretical and in observational analyses. This is largely a consequence of the extensive programme of research which has been, and still is being carried out at Princeton by Peebles and his collaborators (Peebles 1973; Peebles & Hauser 1974; Groth & Peebles 1977; Fry & Peebles 1978). It is well known that a complete description of clustering requires knowledge of the entire infinite hierarchy of correlation functions, whilst in practice only the lowest order functions can be directly obtained from observations. For this reason it is interesting to consider other measures of clustering which display different aspects of the galaxy distribution, and which, in general, depend on *all* the correlation functions. Specific alternative distributions which have been used in the past include the frequency distribution of galaxy counts in cells (Hubble 1936; Zwicky 1957), nearest neighbour distributions (Soneira & Peebles 1977), the probability distribution of a suitably defined density enhancement in the neighbourhood of a galaxy (Bhavsar 1978) and the population distribution or 'multiplicity function' of clusters (Holmberg 1940; Gott & Turner

THE END OF GREATNESS?





GRAPHICS

The Cosmic Chicken

3D numerical model of the Universe

903

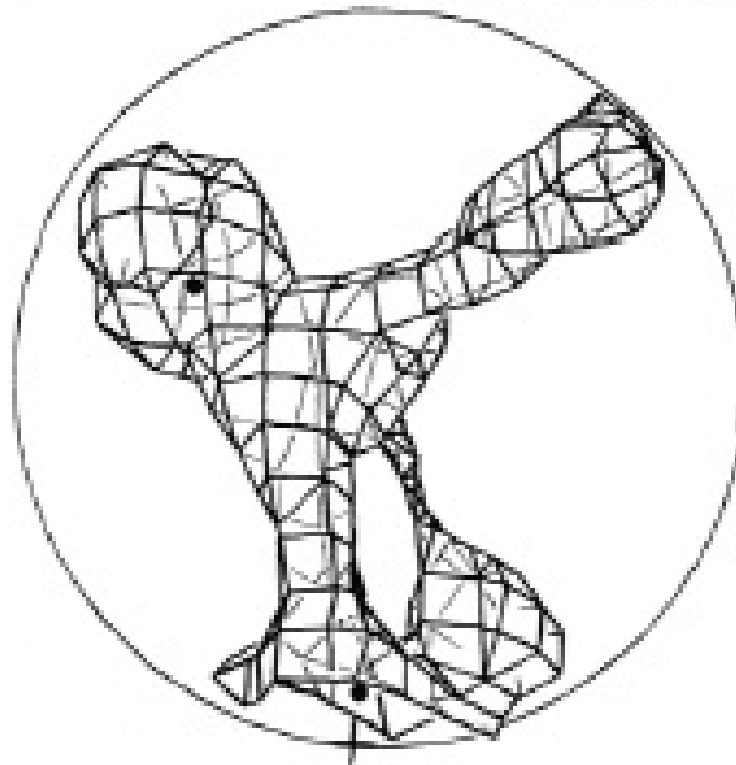
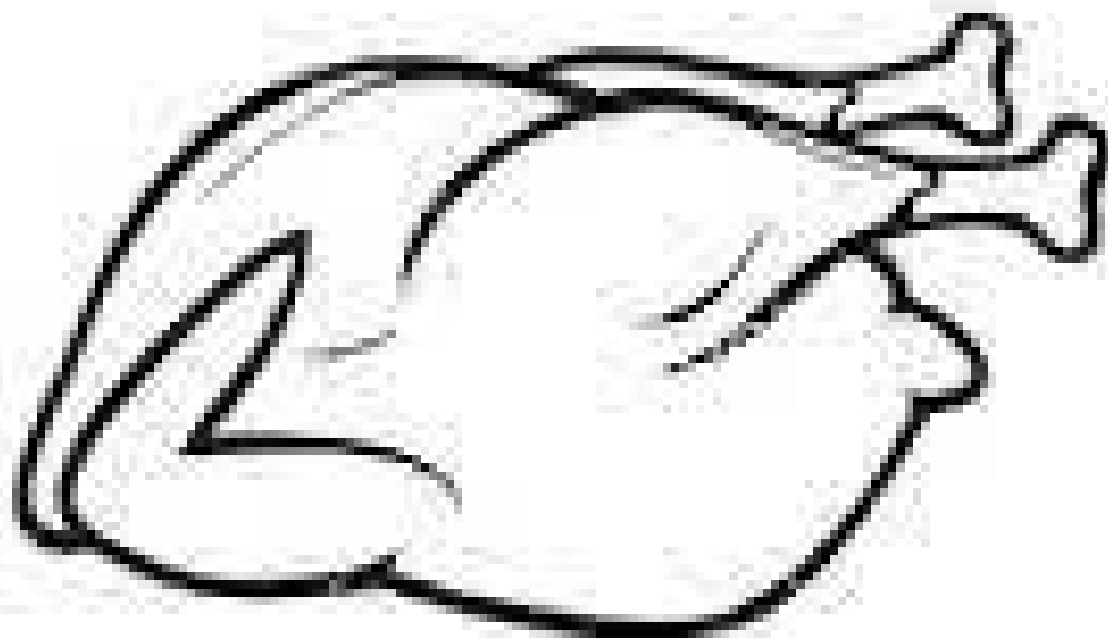


Figure 4. A surface of constant density level is plotted for the same region as that in Fig. 3.



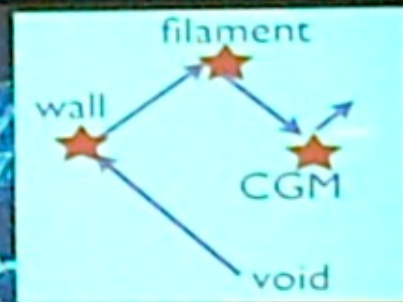
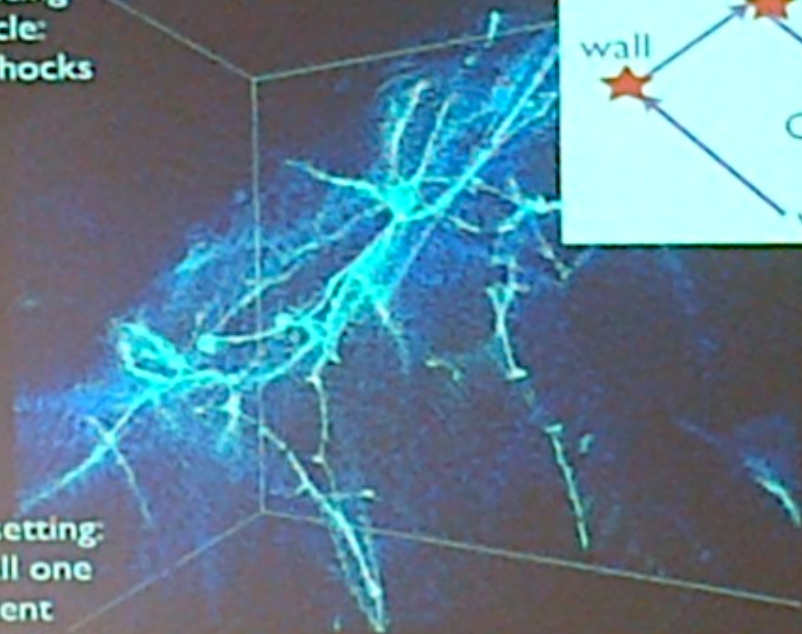
f filaments

olution
ents



gas tracing
particle:
follow shocks

typical setting:
one wall one
filament



Super-duper LSS & the Super-WEB

aka the primordial 3-curvature web aka the phonon/isotropic strain = volume deformation web

$$\ln \rho(x,t) / \langle \rho \rangle_V \quad \ln V / \langle V \rangle_{\rho=3} \ln a(x,t)_{\rho}$$

$$\zeta(x,t) = \int (dE + p dV) / E \quad / \langle 3(1+p/\rho) \rangle(t) \quad \text{NOTES: EMBERS 2000 BY: BOB BERTH-BRANDEN, 2014 \& FOR PREHEATING}$$

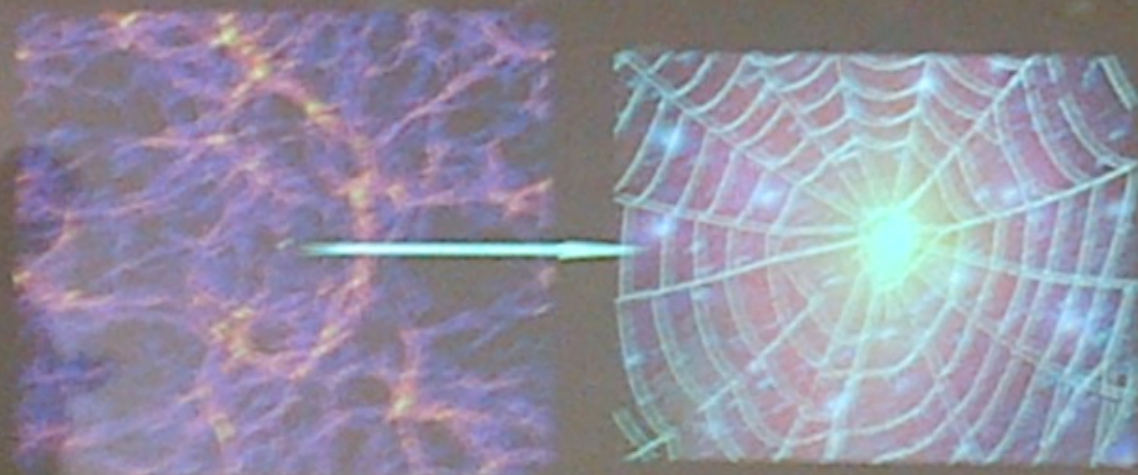
$$\zeta(x,t) = \int \ln \rho(x,t) + \int (1+p/\rho)(x,t) d \ln a^3(x,t) / \langle 3(1+p/\rho) \rangle(t)$$

cf. the density web ~ strain web
 ~ gravitational potential web

$$\ln \rho / \langle \rho \rangle \approx \text{Trace} \ln \mathbf{e}_J^J = \ln V / \langle V \rangle_{\rho}$$

$\langle p/\rho \rangle \rightarrow 0 \Rightarrow \zeta(x,t) \text{ (cdm) conserved before shell crossing (preheating)}$

THE COSMIC WEB
*a home for haloes and galaxies
woven within*



Adaptive simulation



ASTRONOMY OR ASTROPHYSICS?

The Steady State Problem

Poetry Corner

In Tallinn (IAU 308)

The sessions invariably ran late

But, despite being tired,

We're still much inspired

By Yakov Zel'dovich (the Great)

THANKS to the Organizers...

...and have a safe journey home!