

# The cosmic web and microwave background fossilize the first turbulent combustion

*Carl H. Gibson, Professor, MAE and SIO, University of California at San Diego, La Jolla, CA 92093-0411, USA*

*R. Norris Keeler, Consultant, Arlington, VA, USA*

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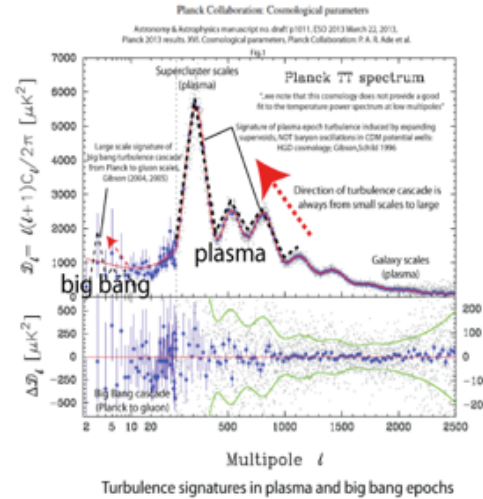
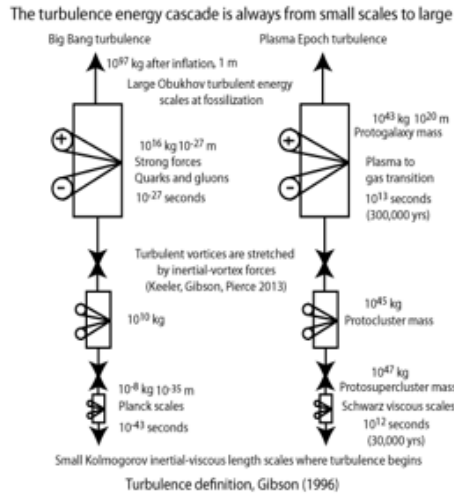
# Abstract

▲ **Yakov Borisovich Zeldovich** pioneered the difficult field of turbulent combustion, and would have appreciated the complexities that arise when collisional fluid mechanics, general relativity, self-gravitational-stratification, fossil turbulence, fossil turbulence waves, and beamed zombie turbulence maser action mixing chimneys are combined in the first turbulent combustion of the big bang. Space telescopes show distinctive fossil turbulence patterns in the cosmic web and in the cosmic microwave background that confirm a big bang turbulent combustion mechanism, where turbulence is defined by inertial vortex forces and Fortov-Kerr negative pressures extract mass-energy from turbulence needed to trigger inflation by gluon viscous stresses of the strong force freeze-out. Such turbulence always cascades from small scales to large (see [journalofcosmology.com](http://journalofcosmology.com) volumes 15-23) and leaves patterns termed fossil turbulence in a variety of hydrophysical fields that preserve information about the previous turbulence. The cosmic microwave background spectrum reveals fossil turbulence patterns at large wavelengths (now  $>10^{25}$  m) fossilizing big bang turbulent combustion, and smaller wavelengths fossilizing viscous gravitational fragmentation of the plasma epoch at  $10^{12}$  seconds to produce  $\sim 10^{24}$  m superclusters and superclustervoids now  $\sim 10^{25}$  m. The CMB spectral turbulence pattern is a single peak reflecting a highly concentrated vortex, and two secondary peaks reflecting transverse secondary vortices at right angles that stretch the primary vortex by inertial vortex forces into a tubular shape about one part per million of the Kolmogorov space time at the Planck conditions of the big bang. Fortov-Kerr negative stresses exceeded  $\sim 10^{113}$  Pa to extract mass-energy from the vacuum. The plasma turbulence peak and its two harmonics has been misinterpreted as sonic oscillations of trapped baryons in cold dark matter potential wells. **LCDMHC cosmology is generally falsified** by the fluid mechanically based cosmology and observations presented, where cold dark matter, dark energy and hierarchical clustering of CDM clumps is questioned. **Schild 1996 proved the dark matter of galaxies is earth-mass planets** of hydrogen-helium, **confirming fluid mechanical predictions of Gibson 1996** that instead, plasma superclusters and clusters of protogalaxies fragmented into Jeans mass clumps of planets at the plasma to gas transition, at time  $10^{13}$  seconds. Stars and larger planets are formed in these protoglobular-star-cluster clumps by binary mergers.

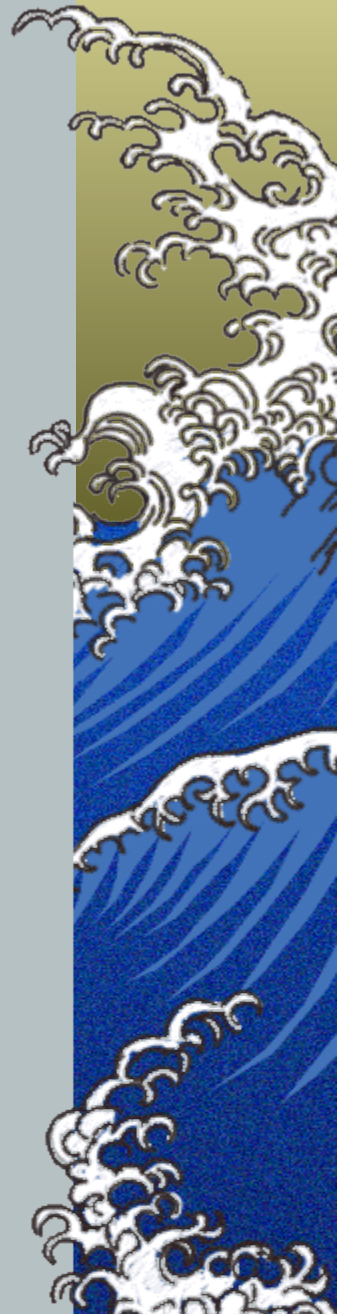
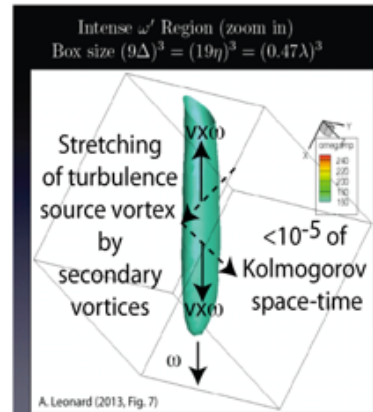
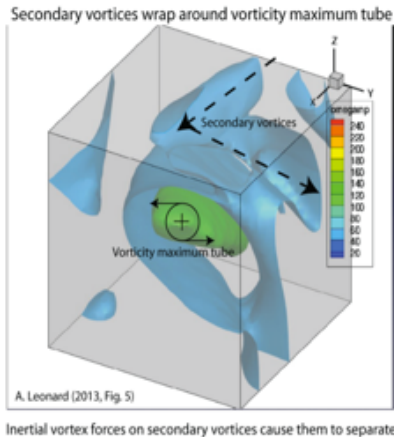


# Fossils of big bang and plasma turbulence appear in the cosmic microwave background

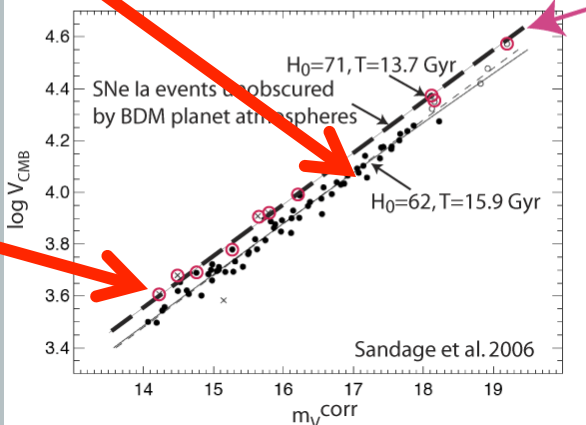
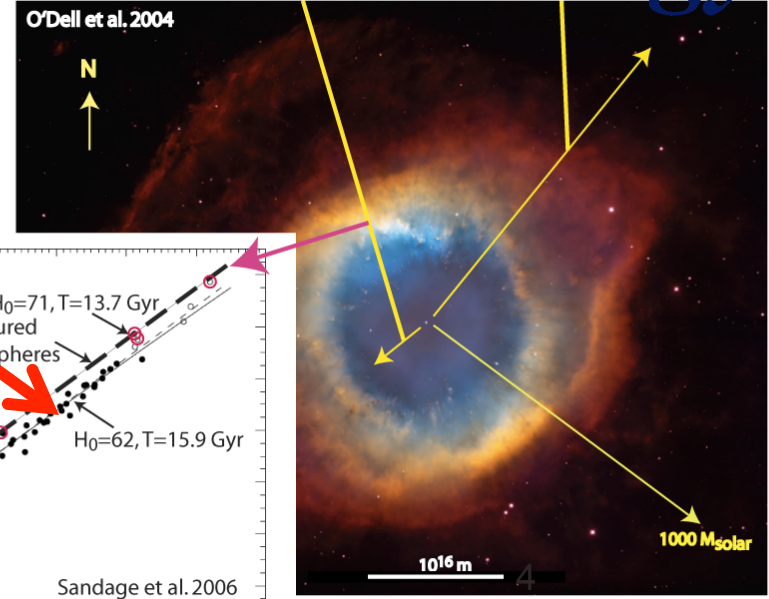
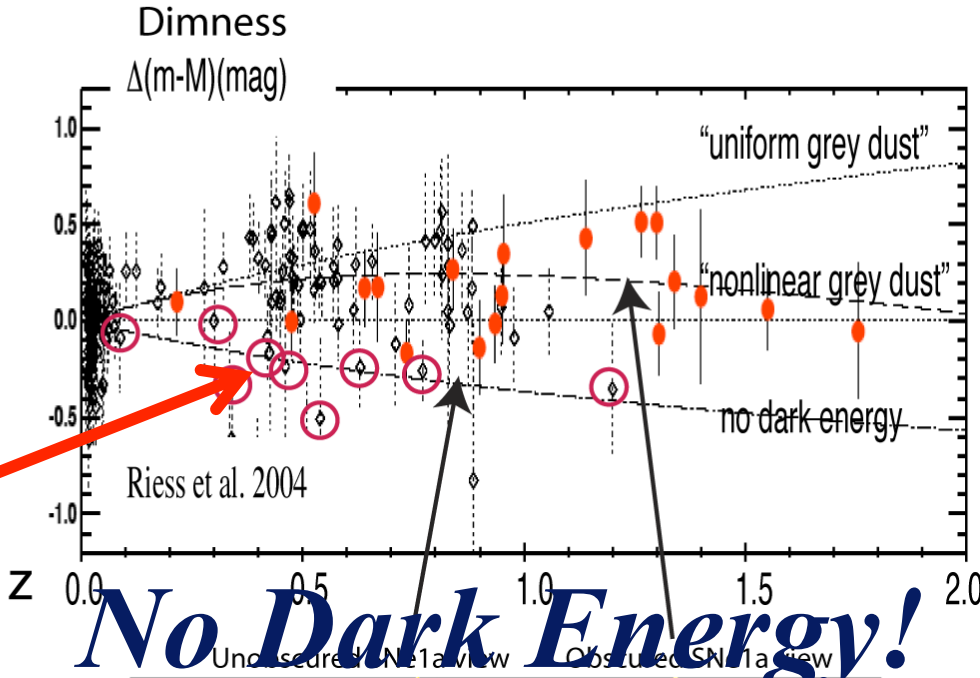
Signatures of big bang turbulence and plasma turbulence emerge from Planck Collaboration



Comparisons to vorticity maps of isotropic turbulence, Leonard (2013)

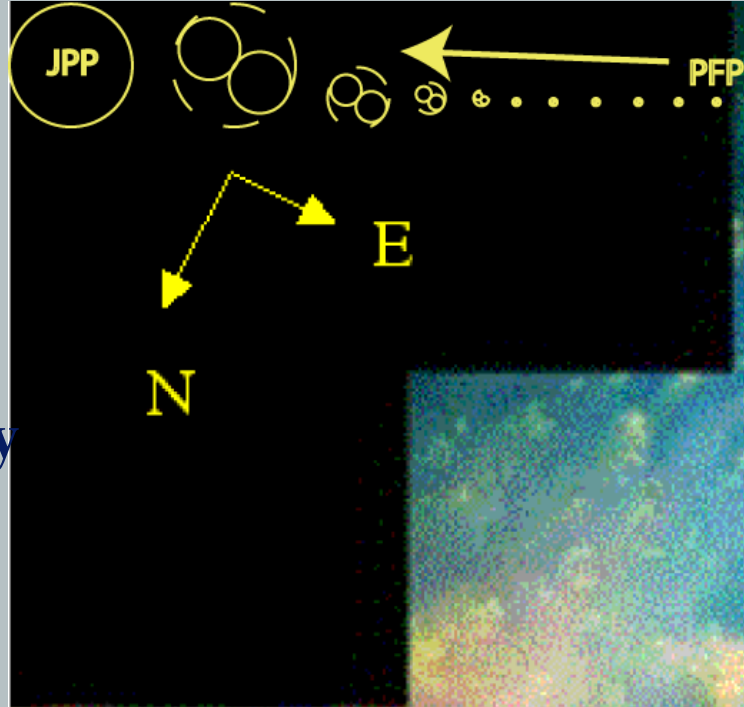


- Supernova Ia brightness versus red shift  $z$  has been used to claim the existence of a very massive “dark energy”
- Helix planetary nebula shows evidence of Jovian planets that explain “dark energy” as a systematic error
- Sandage 2006 SNe Ia Hubble constant universe age 16 Gyr suffers from the same systematic dimming error
- Correction for planet atmosphere dimming gives 13.7 Gyr





Thousands of  
“comets”  
surrounding  
the hot dying  
star in the  
Helix planetary  
nebula are  
evaporating  
primordial fog  
particles  
brought out of  
cold storage to  
reveal the dark  
matter of the  
Galaxy



Evaporating JPPs

$10^{14}$  m (Jupiters)

$10^{25}$  kg

$\rho \approx 10^{-17}$  kg m<sup>-3</sup>

Baryonic density at the time of first structure:  
30,000 years

Evaporating PFPs  
(frozen Earths)

Failed MACHO, EROS, OGLE planet searches  
neglected clumping and intermittency

# Looking down a turbulent vortex line of galaxies

HST view is down the axis of a fossil turbulent vortex line of galaxies created by weak turbulence at the end of the plasma epoch 300,000 years after the big bang



Stephan Quintet before and after Hubble Space Telescope 2009 repair



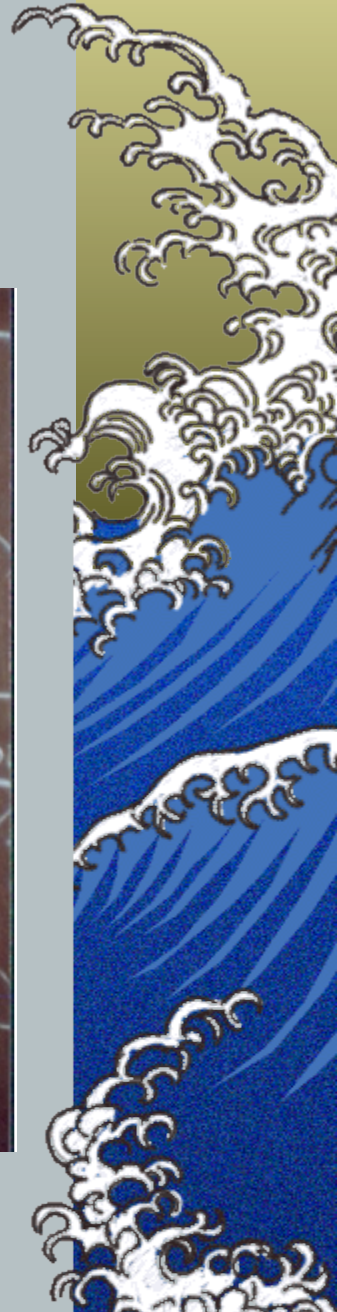
[Amazon.com](https://www.amazon.com)

Carl H. Gibson



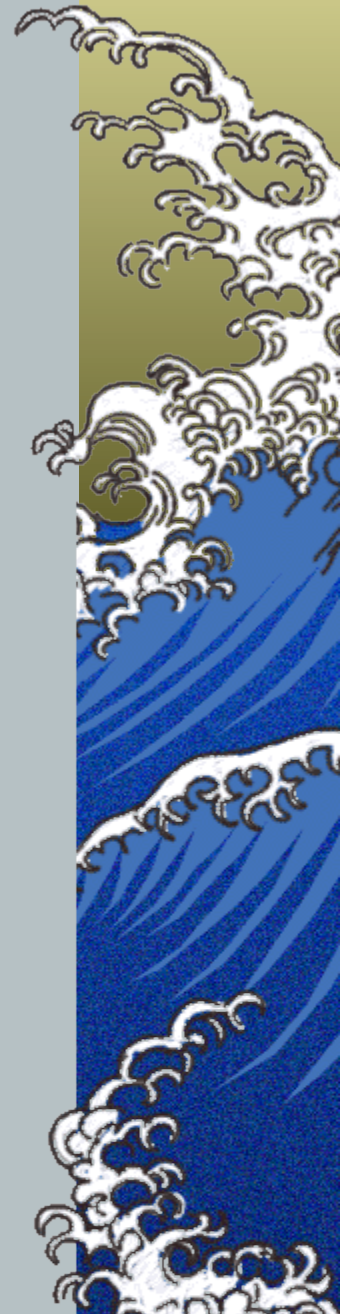
# Keeler, Fortov, Zeldovich

## 26 June 1986



# Outline

- ▶ *Definition of turbulence by  $v_{xw}$  force*
- ▶ *Definition requires a turbulent energy cascade from small to large scales*
- ▶ *Necessary to define fossil turbulence*
- ▶ *Evidence: wakes, jets, boundary layers, mixing layers, big bang*
- ▶ *Crucial to oceans, atmosphere, cosmology, astrophysics, astronomy*

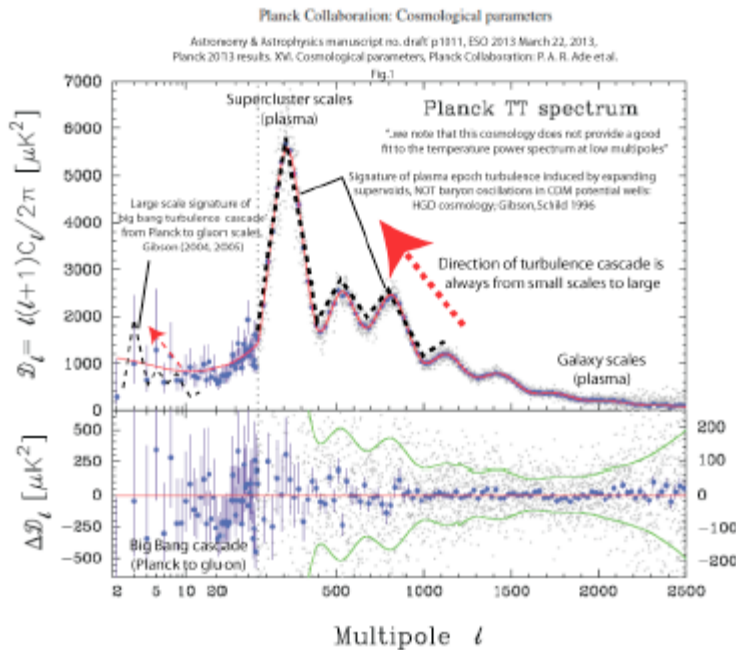




# Planck CMB spectrum

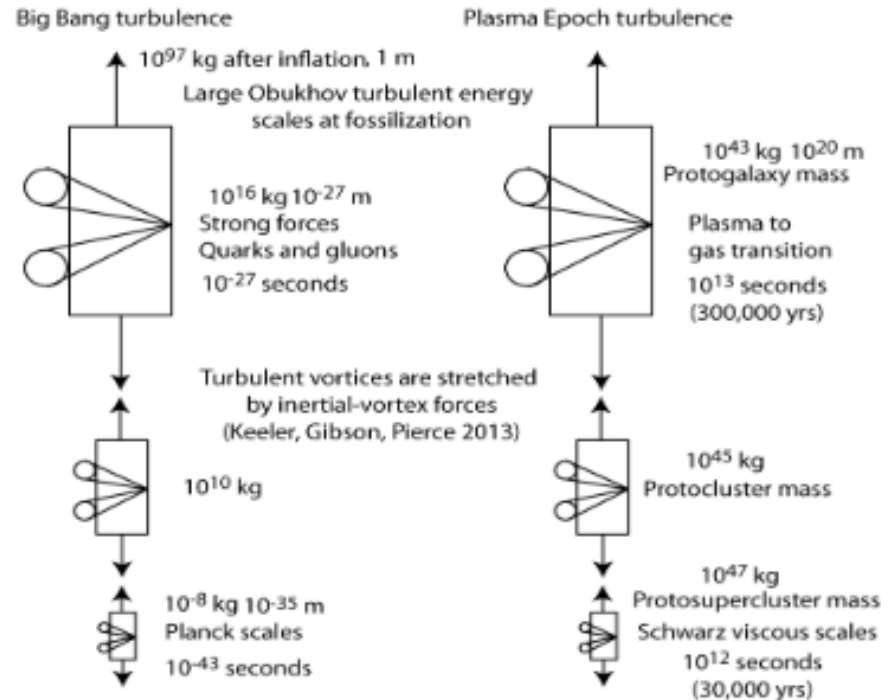
“...we note that this cosmology ( $\Lambda$ CDMHC) does not provide a good fit for small monopoles...”

Journal of Cosmology, 2013, Vol. 22, pp 10654-10660  
 Editorial Commentary



Turbulence signatures in plasma and big bang epochs

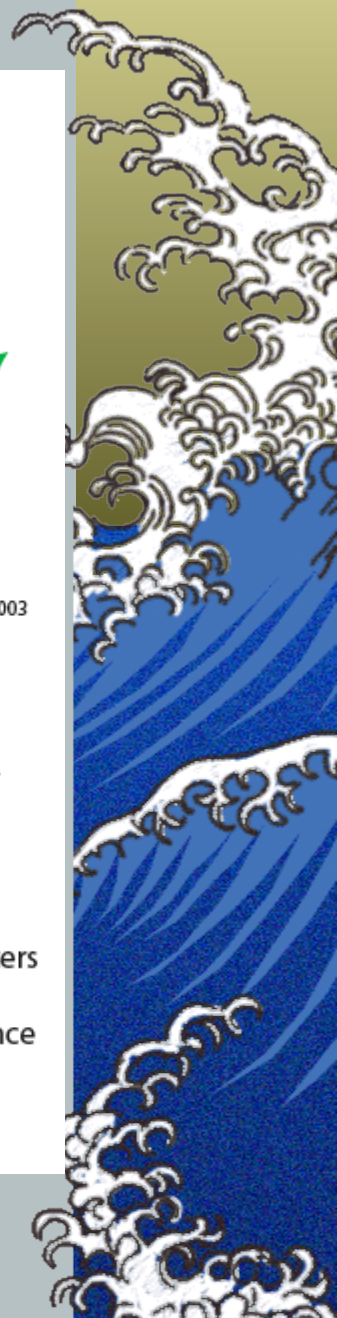
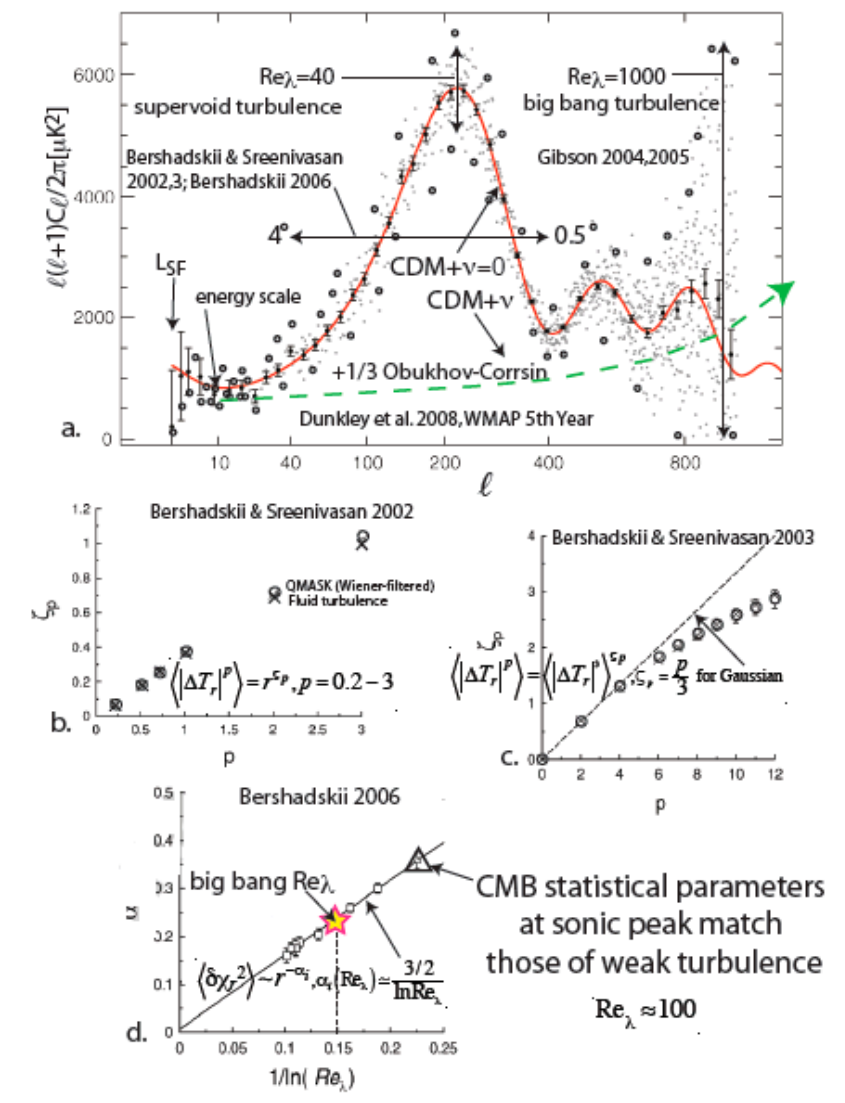
The turbulence energy cascade is always from small scales to large



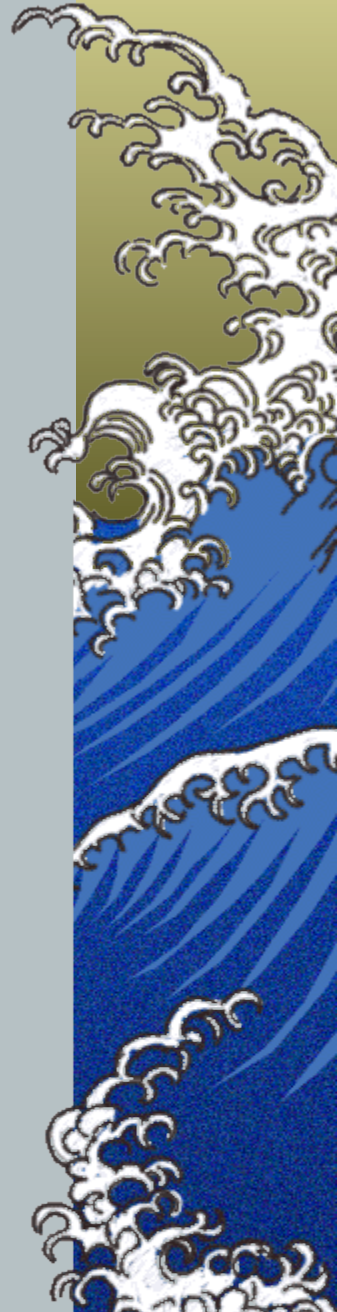
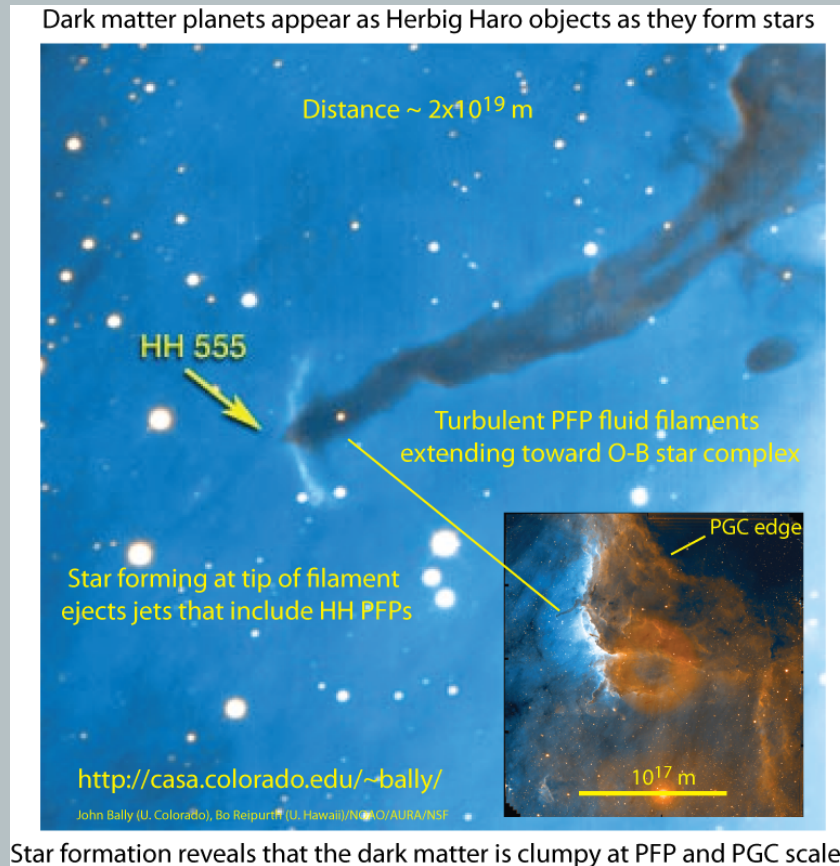
Small Kolmogorov inertial-viscous length scales where turbulence begins  
 Turbulence definition, Gibson (1996)

# Fossils of supervoid and big bang turbulence detected in the cosmic microwave background (CMB)

- Weak turbulence at supercluster void boundaries expands at sonic speeds  $\sim c$ , mixing the temperature
- Strong turbulence patterns reflect the gluon viscosity limit of big bang turbulent mixing
- Bershadskii and Sreenivasan (2002,3,6) show a clear CMB connection to terrestrial turbulence.



# Dark matter planets in PGC clumps make all the stars





# Intermittency of interstellar medium shown by star jets

Stellar accretion disk plasma jet brings dark matter planets out of the dark as Herbig Haro objects

HH 34

Hubble Space Telescope

star plasma jet reveals dark matter planets

1994

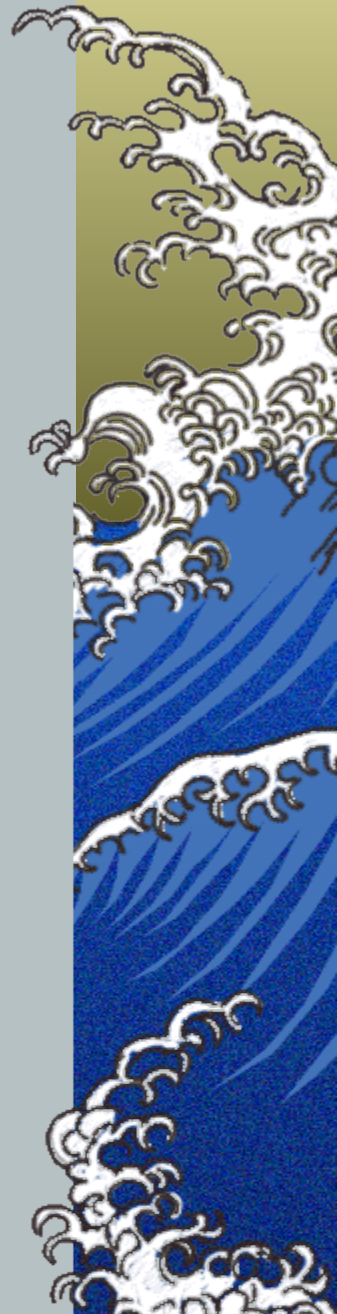
1998

2003

2007

HH jet lengths are limited by their PGC boundaries

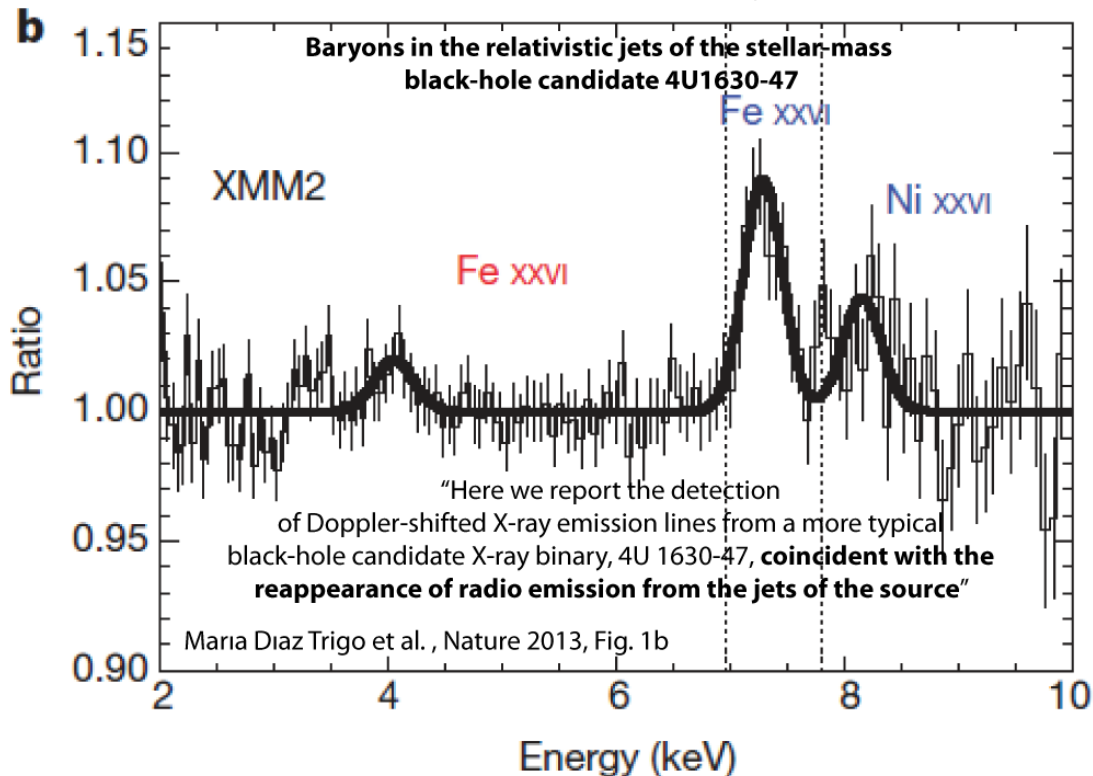
Credit: NASA/ESA/P. Hartigan (Rice University)





# Star jets reveal merging dark matter planets

\* A forming X-ray binary star (not a black hole) eats some dark matter planets and its jets turn back on



\* HGD cosmology interpretation, Gibson, Schild (1996)



# Turbulence in our local PGC clump of dark matter planets

BZTMA mixing of electron density in dark matter planet atmospheres during star formation

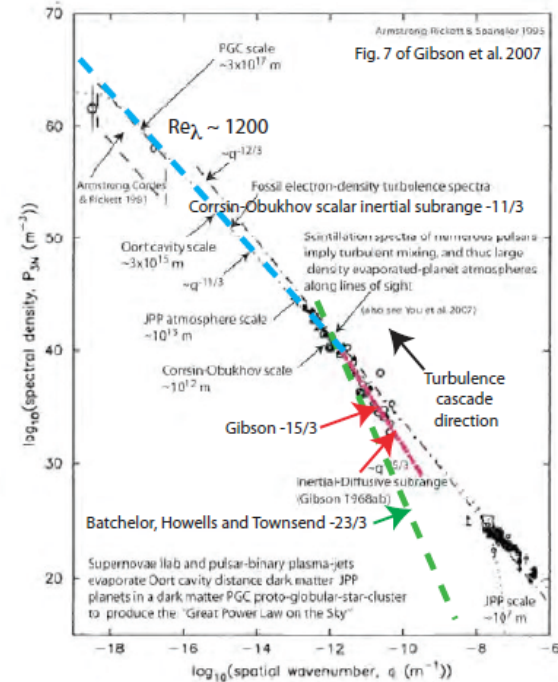
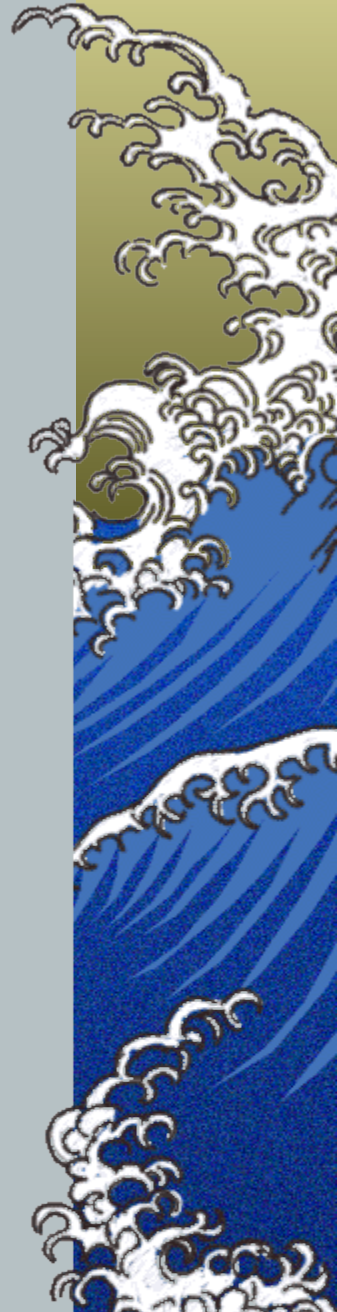
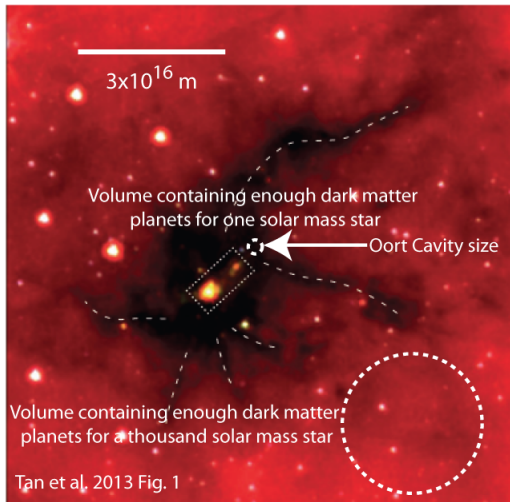


Figure 7. Application of BZTMA mixing theory to understand pulsar electron density fluctuation spectra and star formation from planets<sup>1</sup>. Jovian PFP (primordial -fog-particle) Planets (JPPs) comprise the baryonic dark matter of all galaxies and develop turbulent atmospheres when evaporated by radiation from rapidly spinning white dwarf and neutron stars.



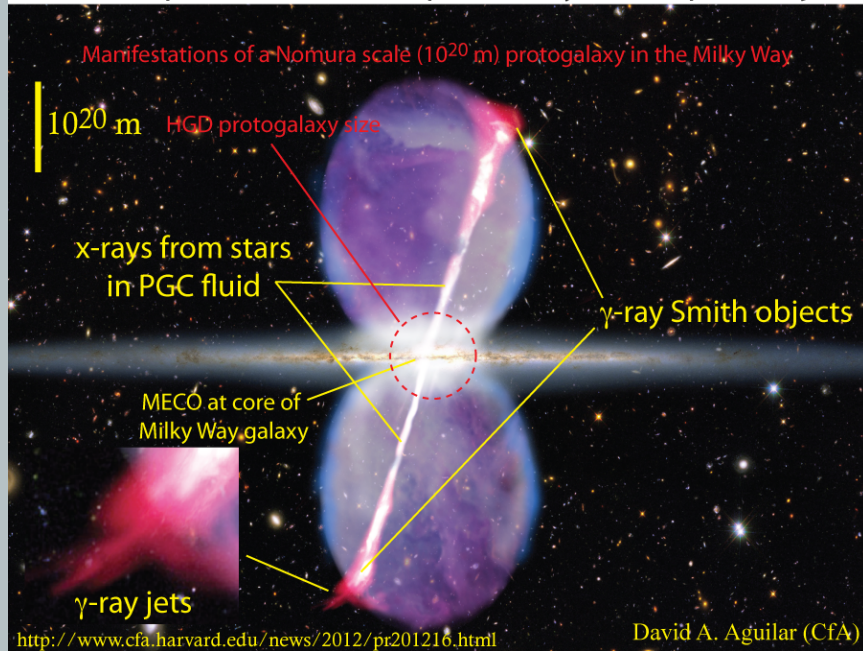
# Turbulence from dark matter planets and their PGC clumps

Dark Matter Planets move as fluid particles in turbulent vortex lines, feeding the formation of bright (but not massive) stars, HGD cosmology (Gibson 1996, Schild 1996)



**Figure 1 | Collapsing cloud.** This infrared image of the SDC335 dark cloud was taken with the Spitzer telescope. Peretto *et al.*<sup>2</sup> find two massive gas cores (dotted box) near the cloud centre, coinciding with infrared sources, which are likely ~~X~~ to be forming massive stars. A web of surrounding filaments (dashed lines) is contracting towards the centre, providing clues to how these cores and stars are forming.

Smith objects show bright star formation triggered from PGC clumps of dark matter planets by MECO plasma jets

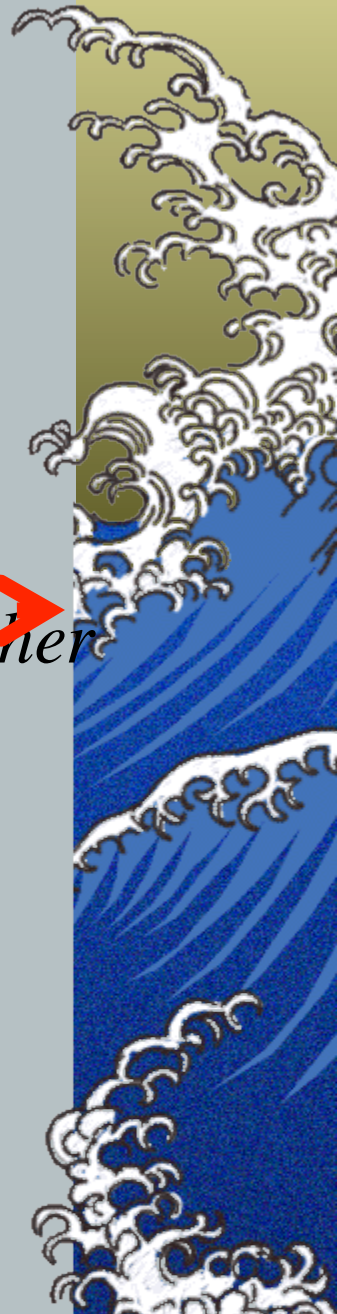




# Momentum Equation

$$\frac{\partial \vec{v}}{\partial t} = -\vec{v}B + \vec{v} \times \vec{\omega}$$
$$+ \vec{F}_{viscous} + \vec{F}_{buoyancy} + \vec{F}_{Coriolis} + \vec{F}_{other}$$

$$B = v^2/2 + p/\rho + 1w$$





# Definitions of Turbulence and Fossil Turbulence

Turbulence is defined as an eddy-like state of fluid motion where the **inertial-vortex forces** of the eddies are larger than any other forces that tend to damp the eddies out.

Turbulence ALWAYS cascades from small scales to large

Fossil turbulence is defined as a perturbation in any hydrophysical field produced by turbulence that persists after the fluid is no longer turbulent at the scale of the perturbation.



# Definitions of **turbulence** and **fossil turbulence** and the direction of the turbulence cascade

Turbulence is defined as an eddy-like state of fluid motion where the inertial vortex forces of the eddies are larger than any of the other forces that tend to damp the eddies out.

**Fossil  
turbulence  
waves  
allow seals  
to survive  
dark polar  
winters**



**Turbulence  
ALWAYS  
cascades  
from small  
scales to  
large**

**Fossil Vorticity Turbulence Detectors**

Fossil turbulence is defined as a perturbation in any hydrophysical field produced by turbulence that persists after the fluid is no longer turbulent on the scale of the perturbation.

*Turbulence always cascades from small scales to large*

# Physical Mechanisms

$$\vec{v} \times \vec{\omega}$$

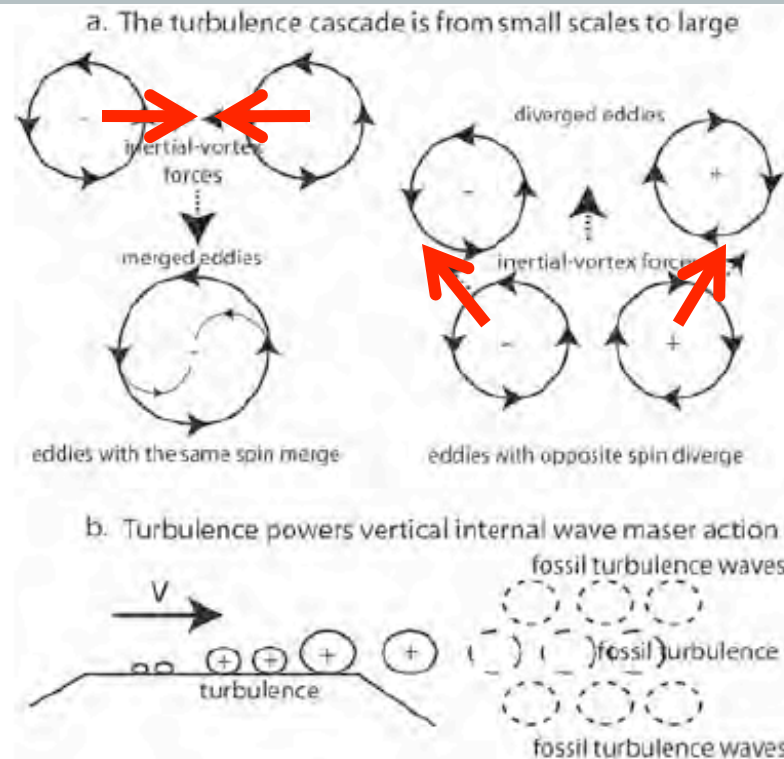


Figure 3. Physical mechanisms of turbulence and stratified turbulence. a. Vortex mechanisms of the turbulence cascade from small scales to large. Adjacent eddies with the same vorticity produce inertial vortex forces  $\vec{v} \times \vec{\omega}$  (dashed arrows) that cause merging. Nearby eddies with opposite spin diverge and expand the turbulent region driven by  $\vec{v} \times \vec{\omega}$  forces. b. Turbulence, fossil turbulence, and fossil-turbulence-waves in a stratified fluid produce internal-wave maser-action where turbulent kinetic energy fossilized by buoyancy forces is radiated near vertically as fossil turbulence waves (FTWs).



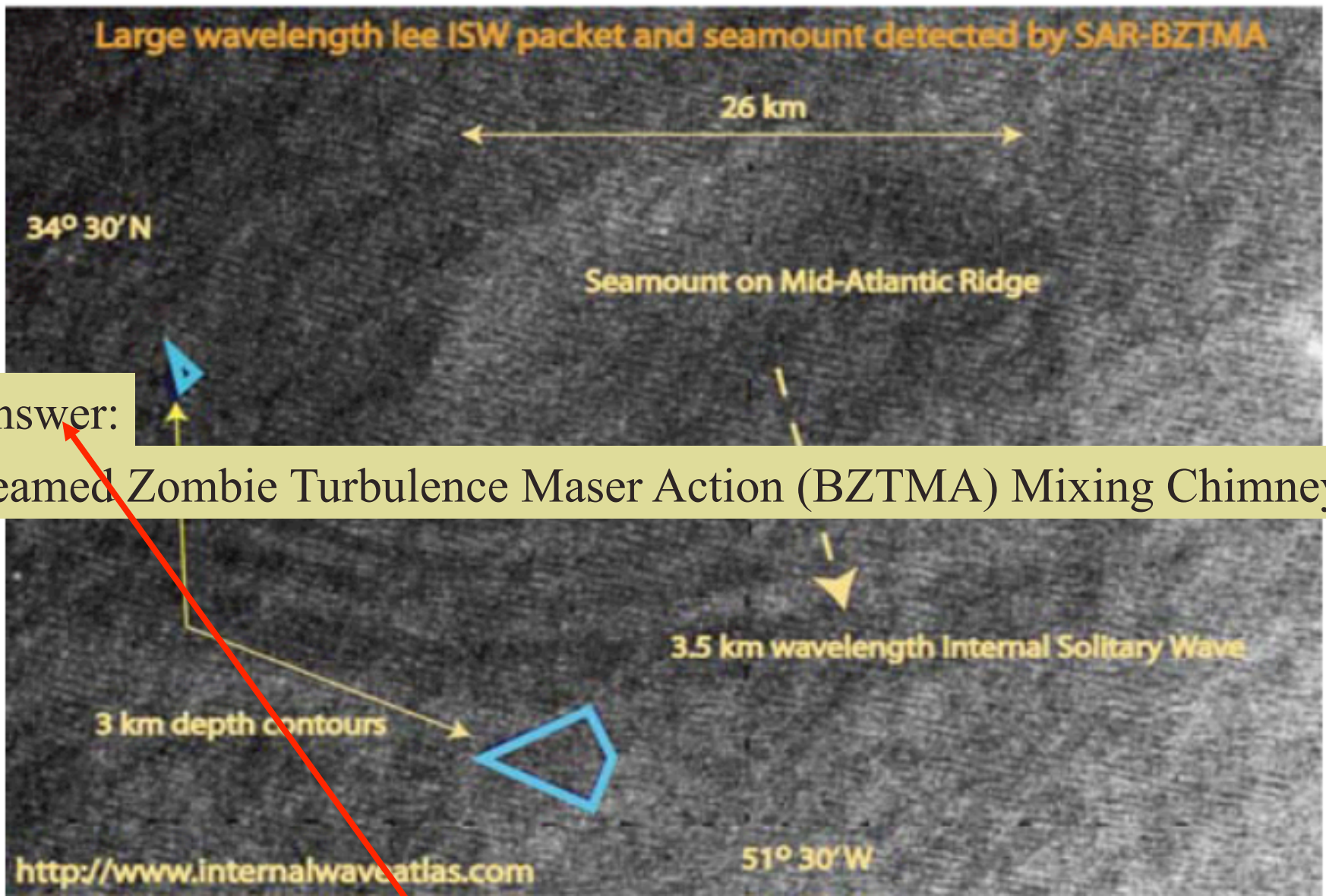
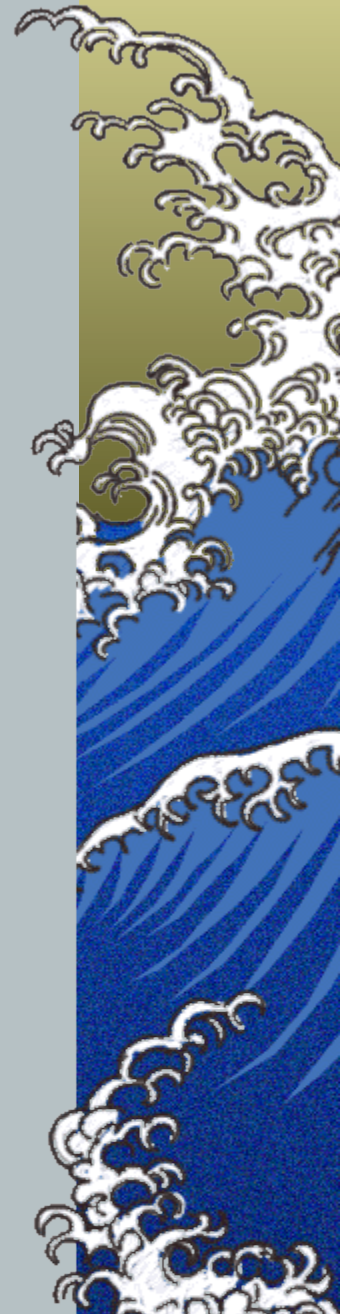
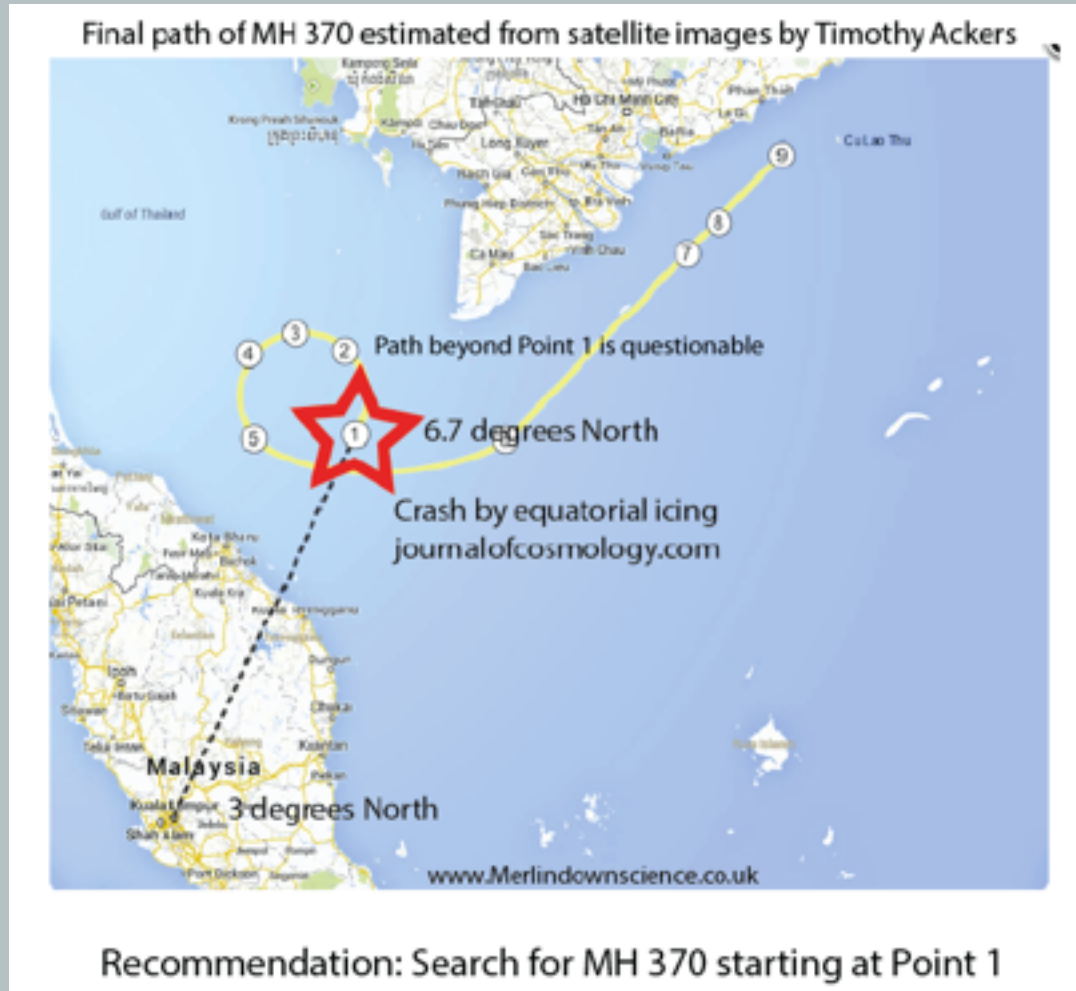


Figure 1. Seamount and internal tidal waves from space. How is this information transmitted?



# Aircraft crashes from big bang turbulence mechanism



# Conclusions –new cosmology

1. *Hydro-Gravitational Dynamics (HGD) describes the gravitational structure formations of cosmology*
2. *The standard  $\Lambda$ CDMHC model is wrong and must be abandoned*
3. *Galaxy dark matter is primordial PFP planets in PGC clumps*
4. *No dark energy!*



# Conclusions-natural fluids

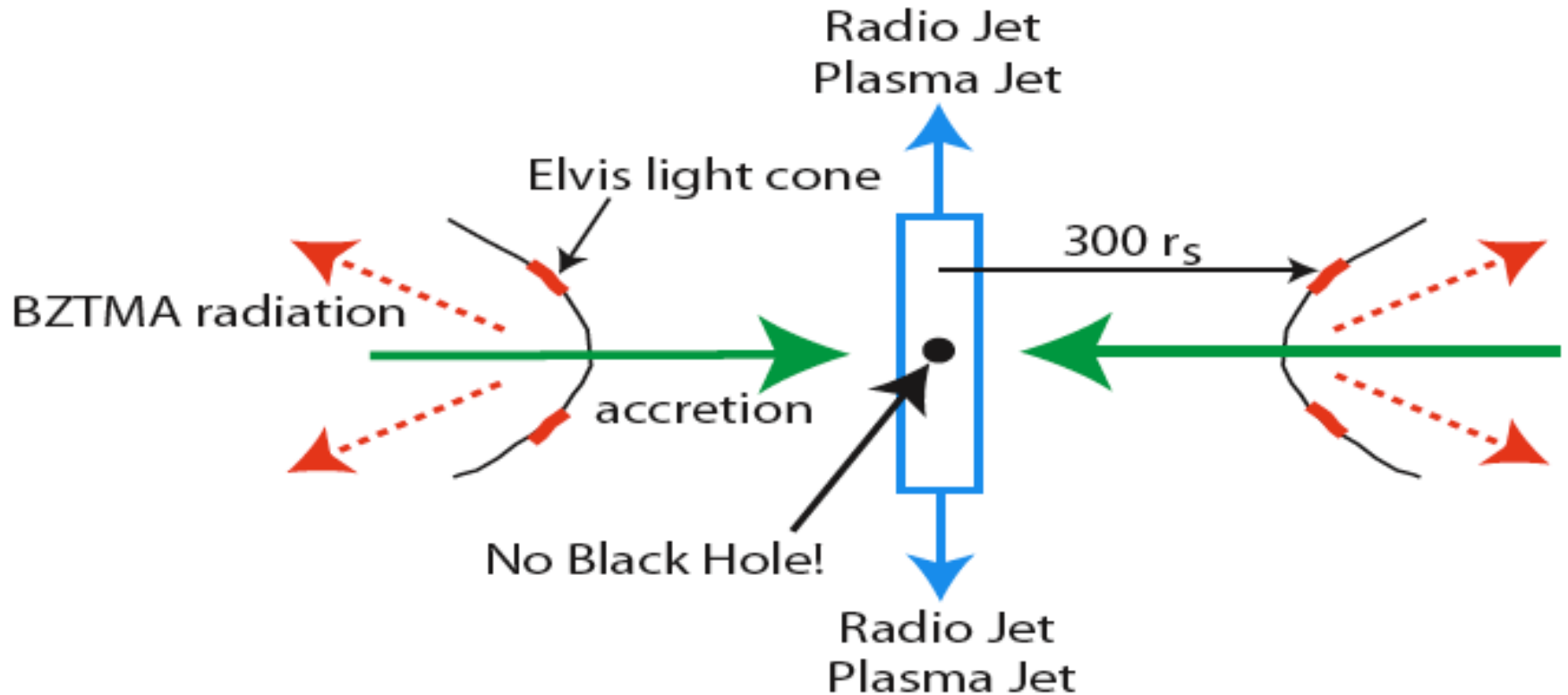
- *Turbulence is driven by inertial-vortex forces*
- *Turbulence cascades from small scales to large*
- *Turbulence in **natural fluids** fossilizes at large scales*
- *Vertical and radial transport involves a complex interaction between turbulence, fossil turbulence, zombie turbulence, and zombie turbulence waves*
- *Intermittency effects cannot be neglected*

**The End**

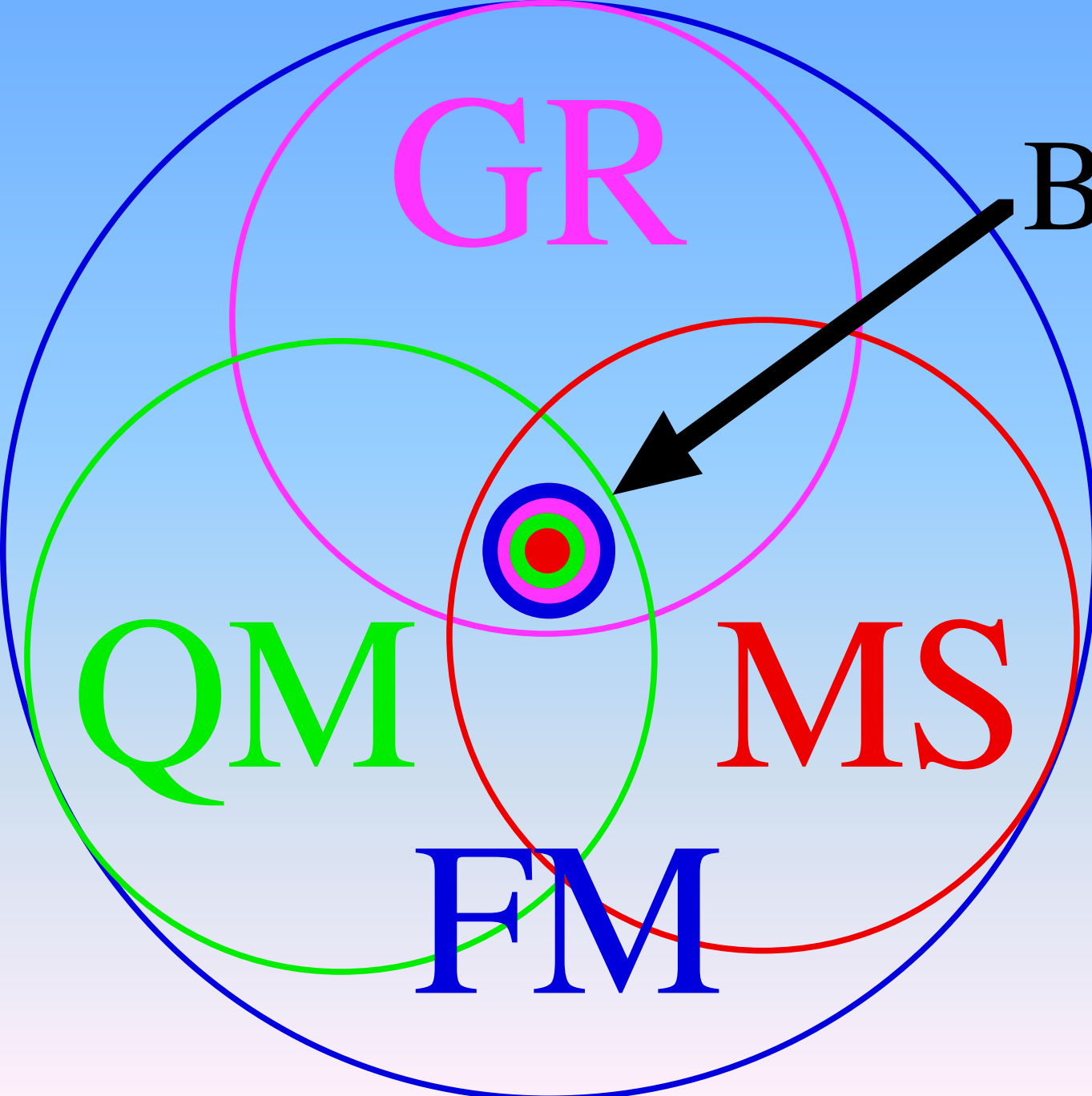


# Q0957+561 AB quasar "The Twin"

$M=10^{40}$  kg,  $r_s=6 \times 10^{12}$  m



BZTMA radiation in galaxy centers



**Big Bang**

Turbulent  
Combustion  
occurs at the  
Planck scale  
( $10^{-35}$  meter)



# Critical Turbulence Length Scales



$$L_H = ct$$



$$L_S = mG / c^2$$



$$L_P = (c^{-3} hG)^{1/2}$$



$$\left[ L_K = (v^3 / \varepsilon)^{1/4} \right]_P \approx L_P = (c^{-3} hG)^{1/2}$$

$$L_R = (\varepsilon / N^3)^{1/2} = L_{ST} = (\varepsilon / (\rho G)^{3/2})^{1/2}$$

$$L_{RF} = (\gamma v / N^2)^{1/2} \sim L_{SV} = (\gamma v / \rho G)^{1/2}$$



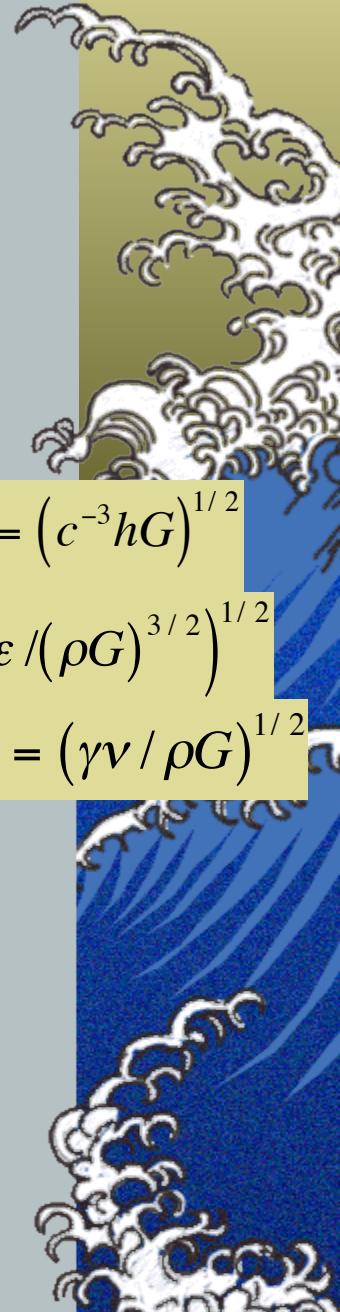
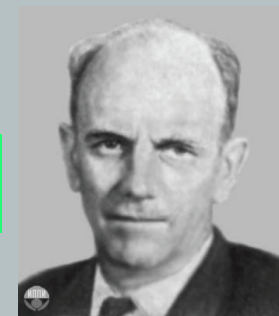
$$L_J = V_{sound} / \sqrt{\rho G}$$



$$L_C = h / mc$$



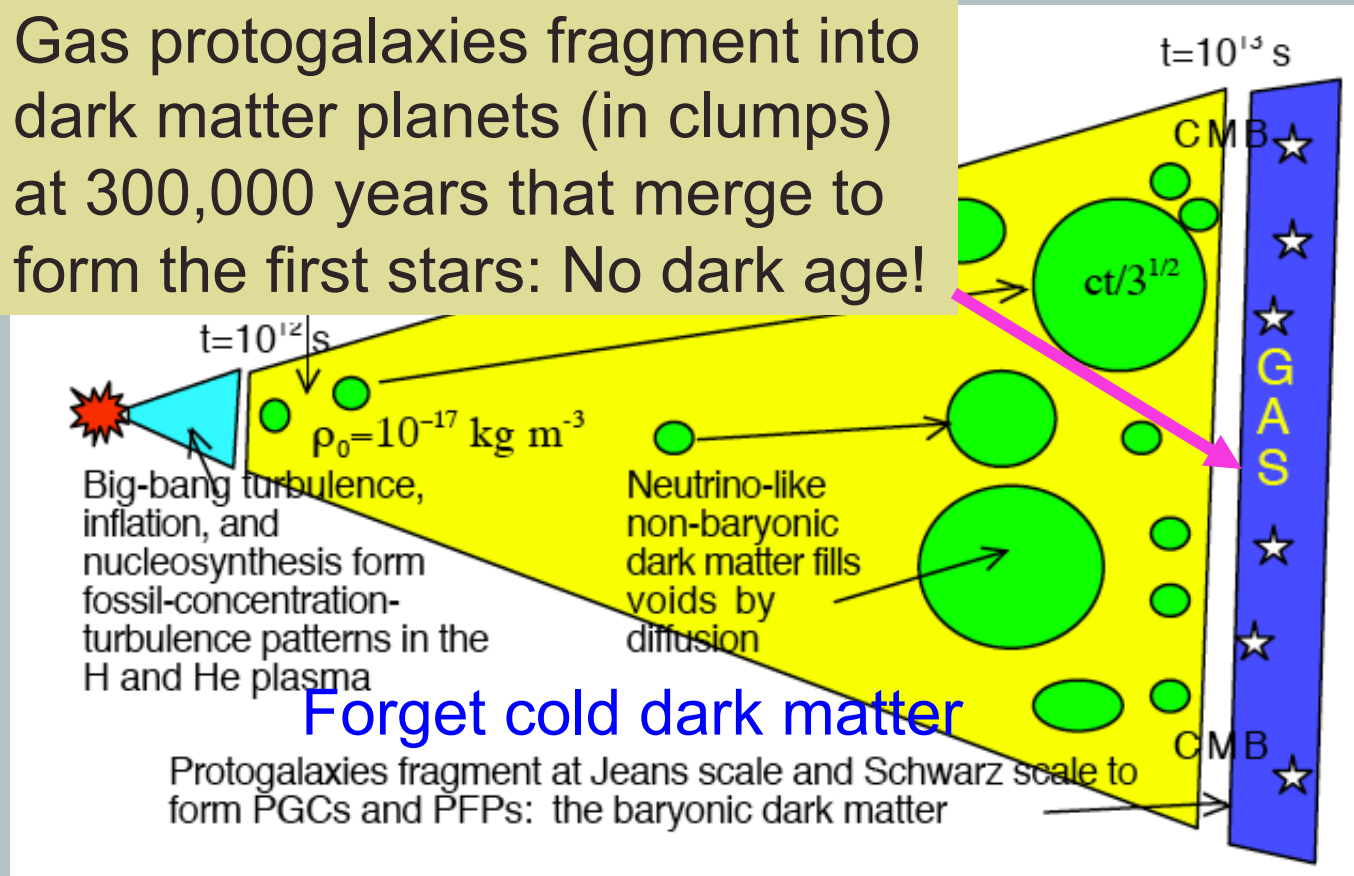
$$L_{SD} = (D^2 / \rho G)^{1/4}$$





# Hydro-gravitational structure formation after the big bang

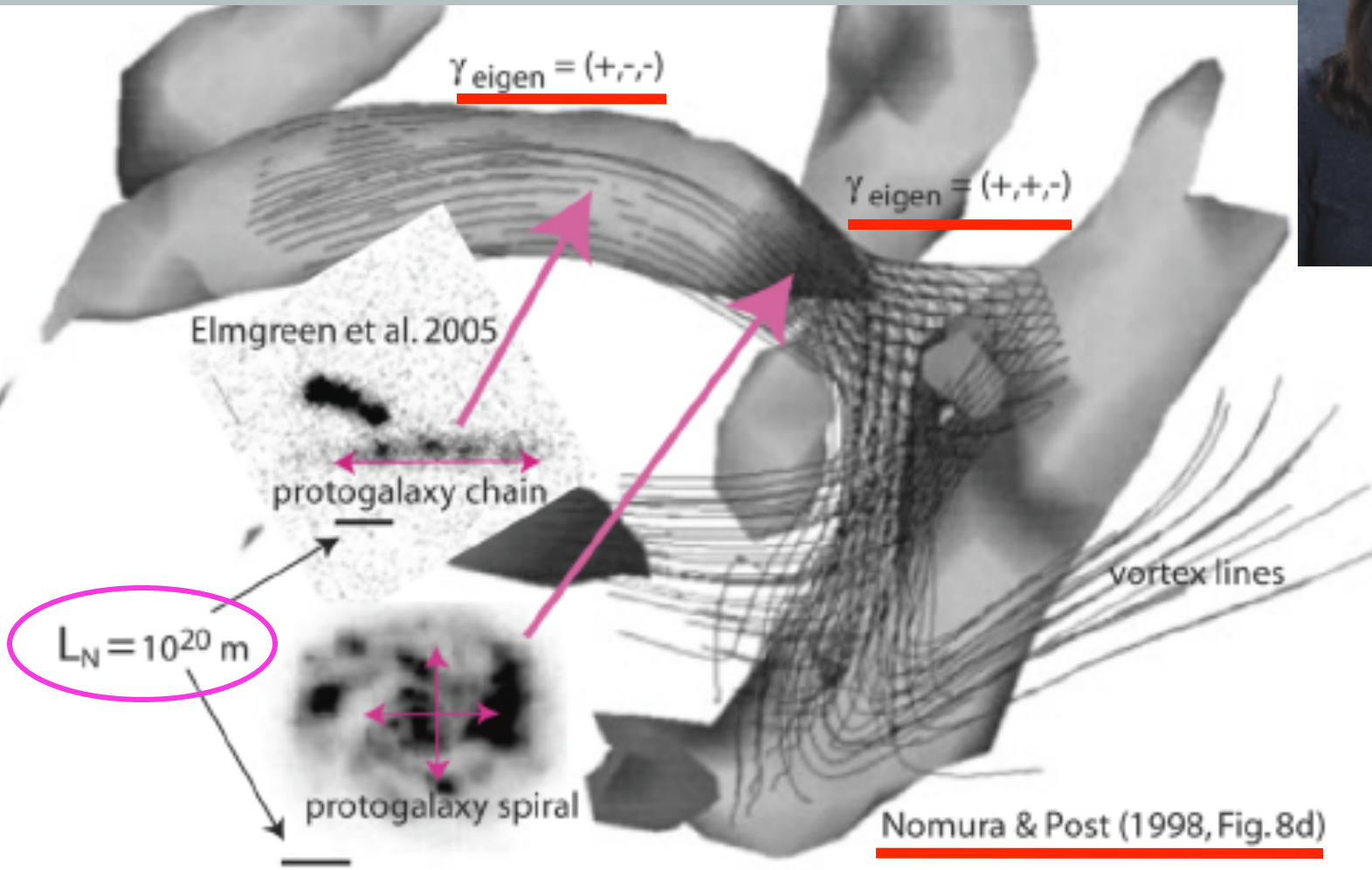
Gas protogalaxies fragment into dark matter planets (in clumps) at 300,000 years that merge to form the first stars: No dark age!



Forget cold dark matter

Protogalaxies fragment along turbulent vortex lines and in spiral pancakes

# The Nomura Scale



Protogalaxies fragment along turbulent vortex lines and in spiral pancakes



# Gravitational magnification of dim protogalaxies

Background chains and clumps (protogalaxies) magnified by elliptical galaxies

← clump with luminous tail

chains of clumps

double clump

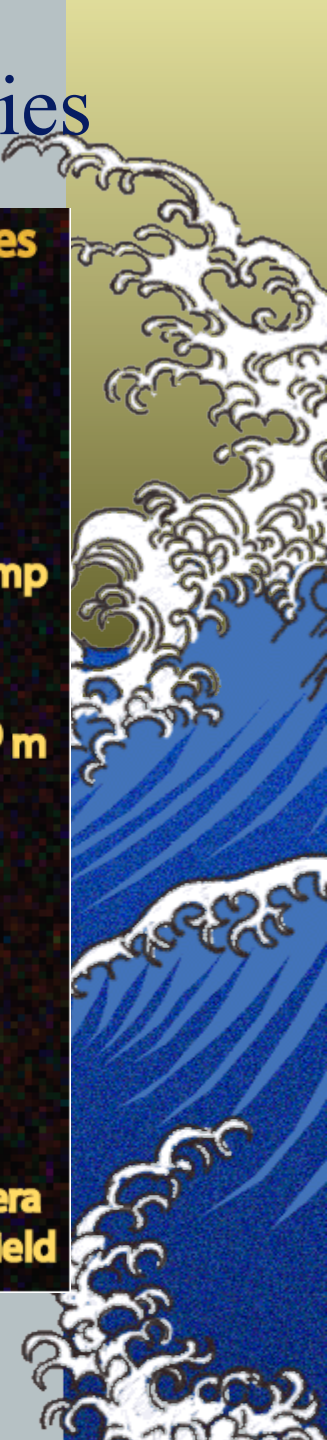
$L_N$   
 $L_{SV}(\text{plasma}) = 10^{20} \text{ m}$

clumps

ellipticals

40 hrs ACS camera  
HST Fornax deep field

STScI-PRC2005-20

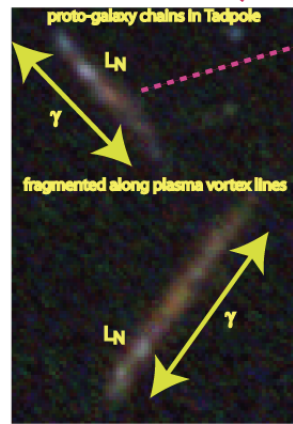
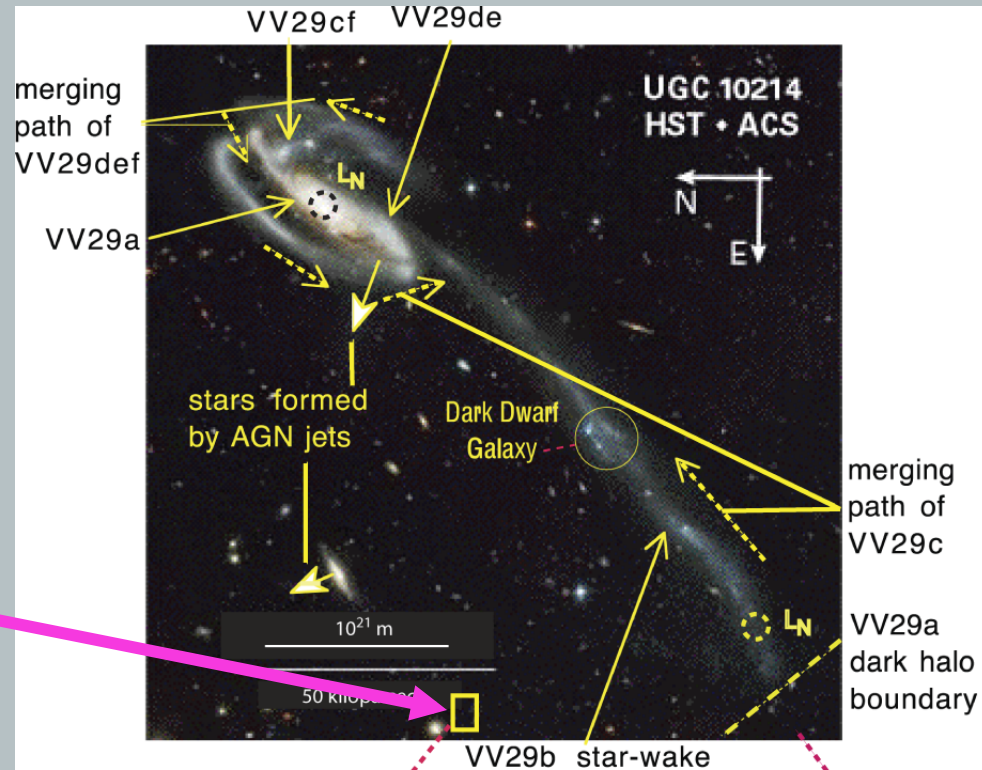




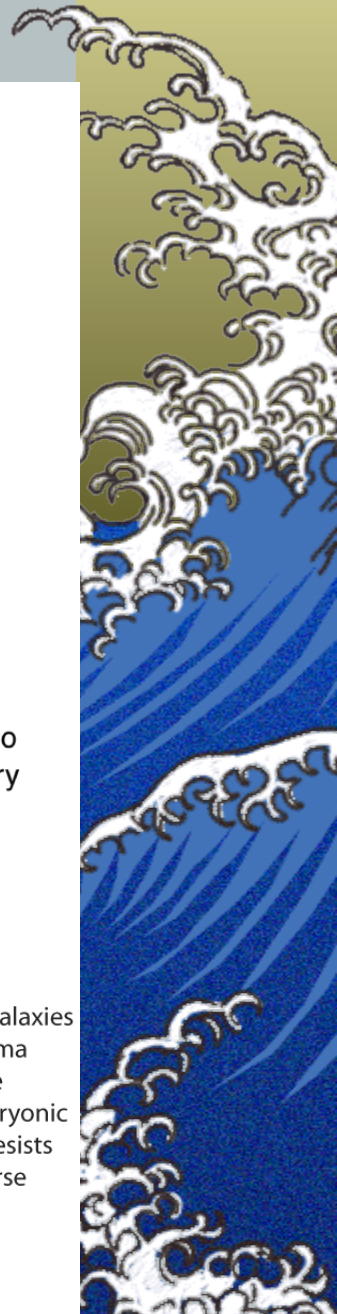
# Tadpole galaxy (VV29) merger

*High resolution HST images reveal the PGC composition and large size of the VV29a dark matter halo*

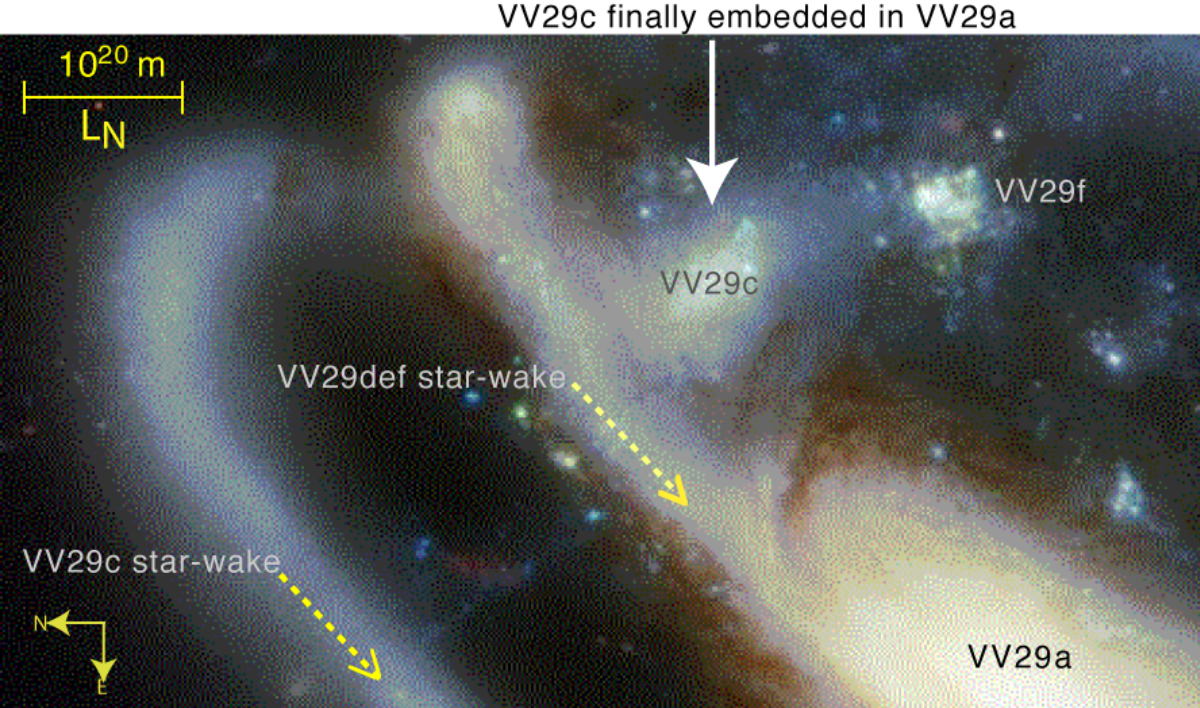
*Background reveals protogalaxies in chains, demonstrating that protogalaxy formation occurred by gravitational fragmentation during the plasma epoch*



Many of the dimmest and most distant luminous objects [11] are linear "chain galaxies", doublets, triplets, and tadpoles interpreted here as proto-galaxies fragmented at size  $L_N$  in the viscous plasma epoch along turbulence vortex lines. The luminosity reflects stars formed in the baryonic dark matter halos, whose PGC-viscosity resists stretching by the expansion of the universe with rate-of-strain  $\gamma = t^{-1}$  [5,6]. PFP-planet-viscosity keeps the PGCs in meta-stable equilibrium.





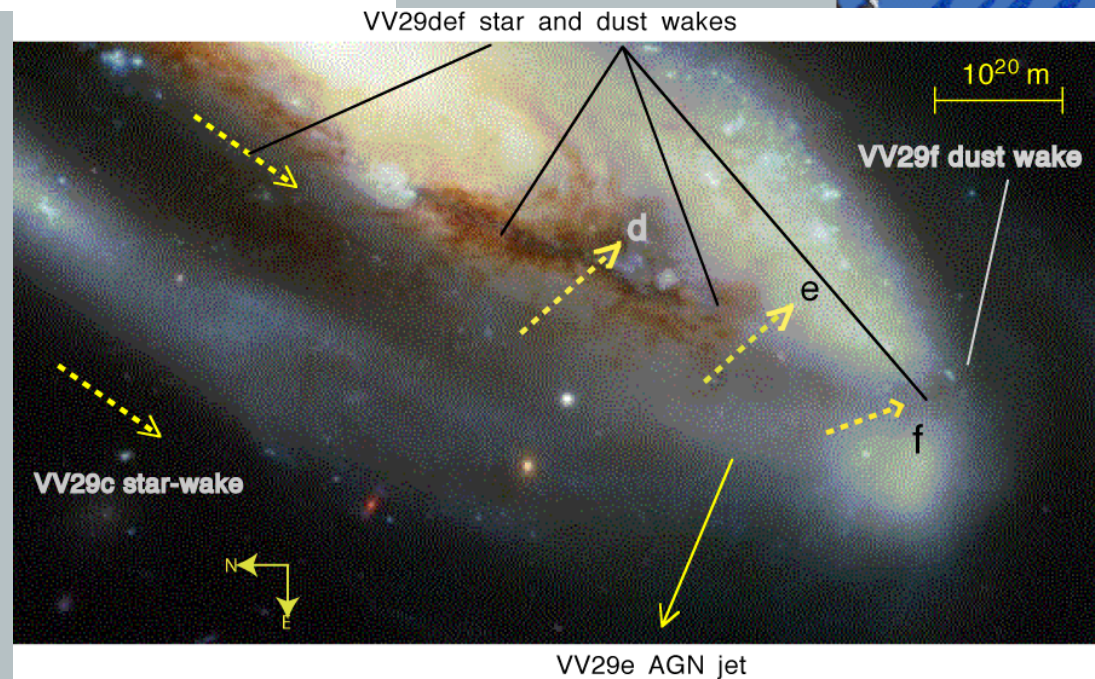


VV29c frictional spiral path around VV29a

# Star and dust wakes in the dark matter halo

- ▶ *VV29c and VV29f in disk*
- ▶ *VV29 d and VV29e in core*

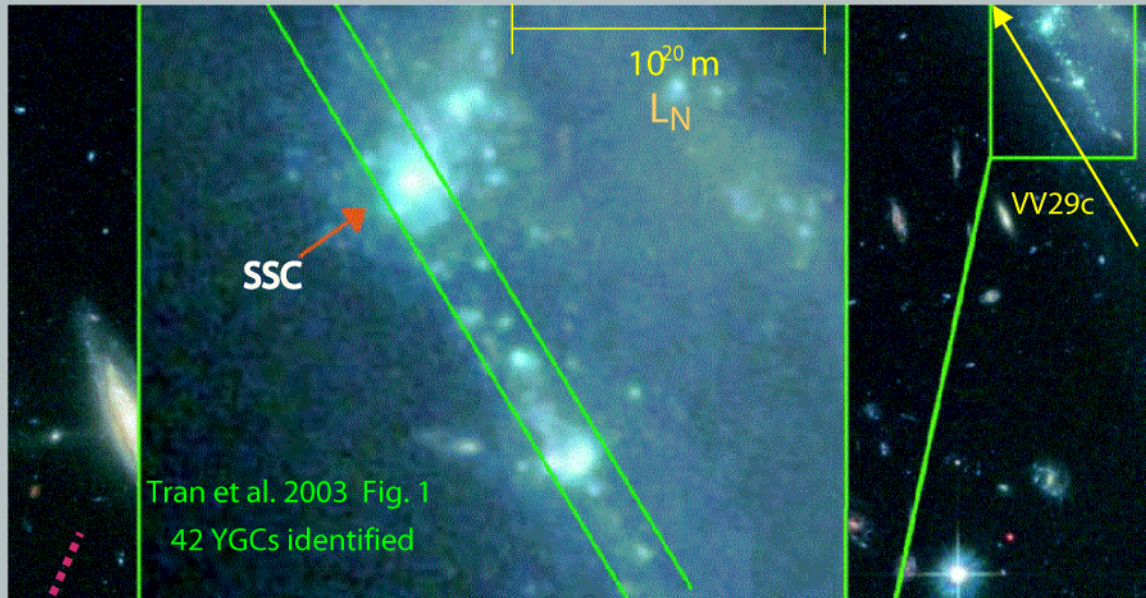
- ▶ *Dark matter must be baryonic to form stars*
- ▶ *The observations indicate dark matter planets in clumps as the halo dark matter*



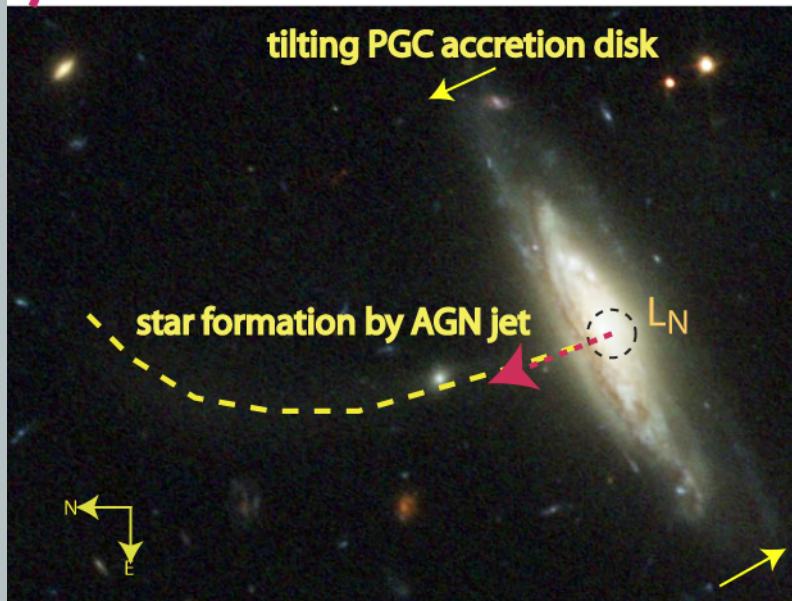
VV29e AGN jet



- Young globular star clusters are brought out of the dark by the merger event



- Star formation reveals the galaxy dark matter is frozen planets in PGC clumps

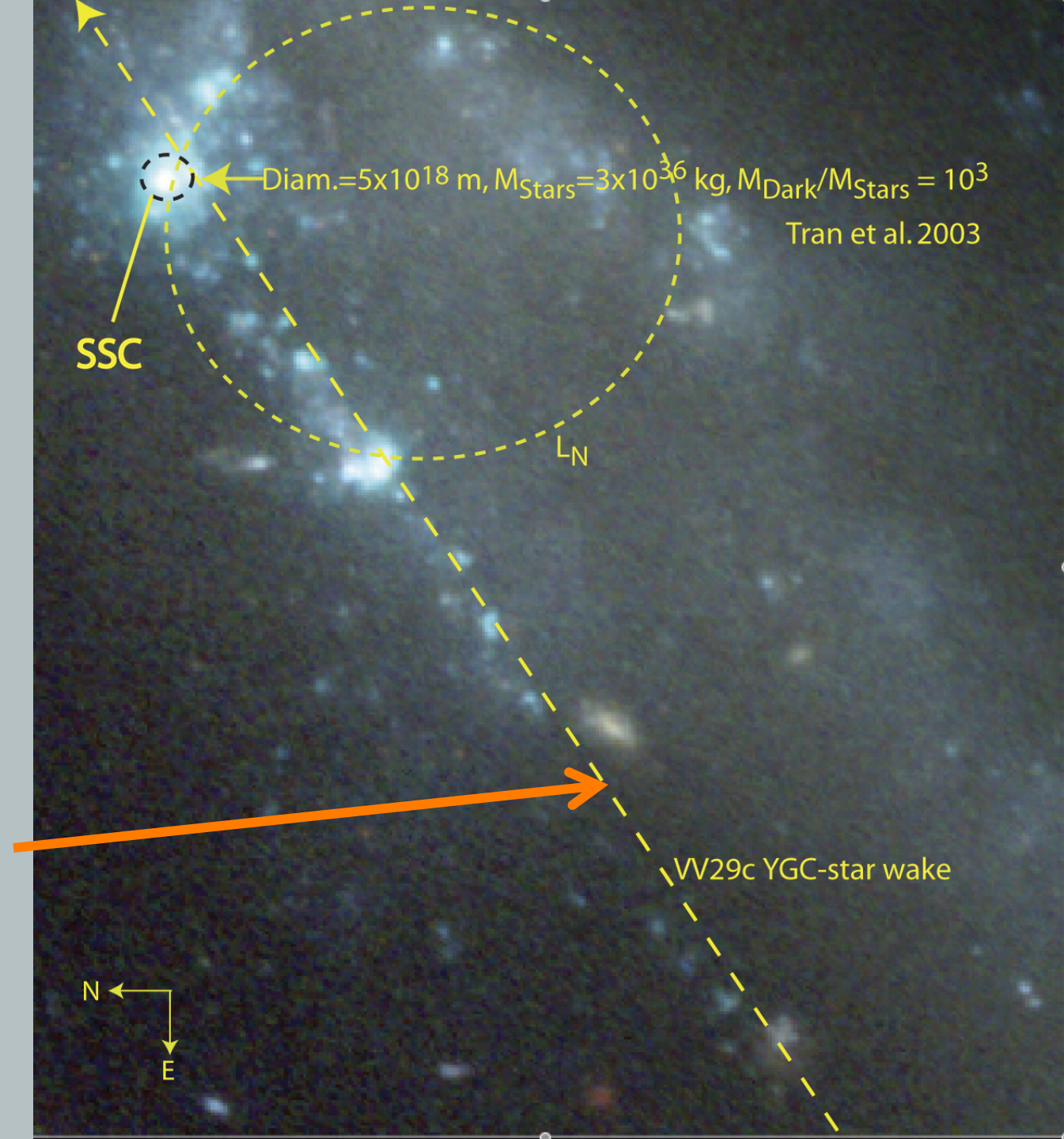


AGN jet triggers star formation in a galaxy's dark matter halo. The spiral star and dust trails triggered in the PGC accretion disk reveal the BDM, and show that the disk is tilting within the halo.



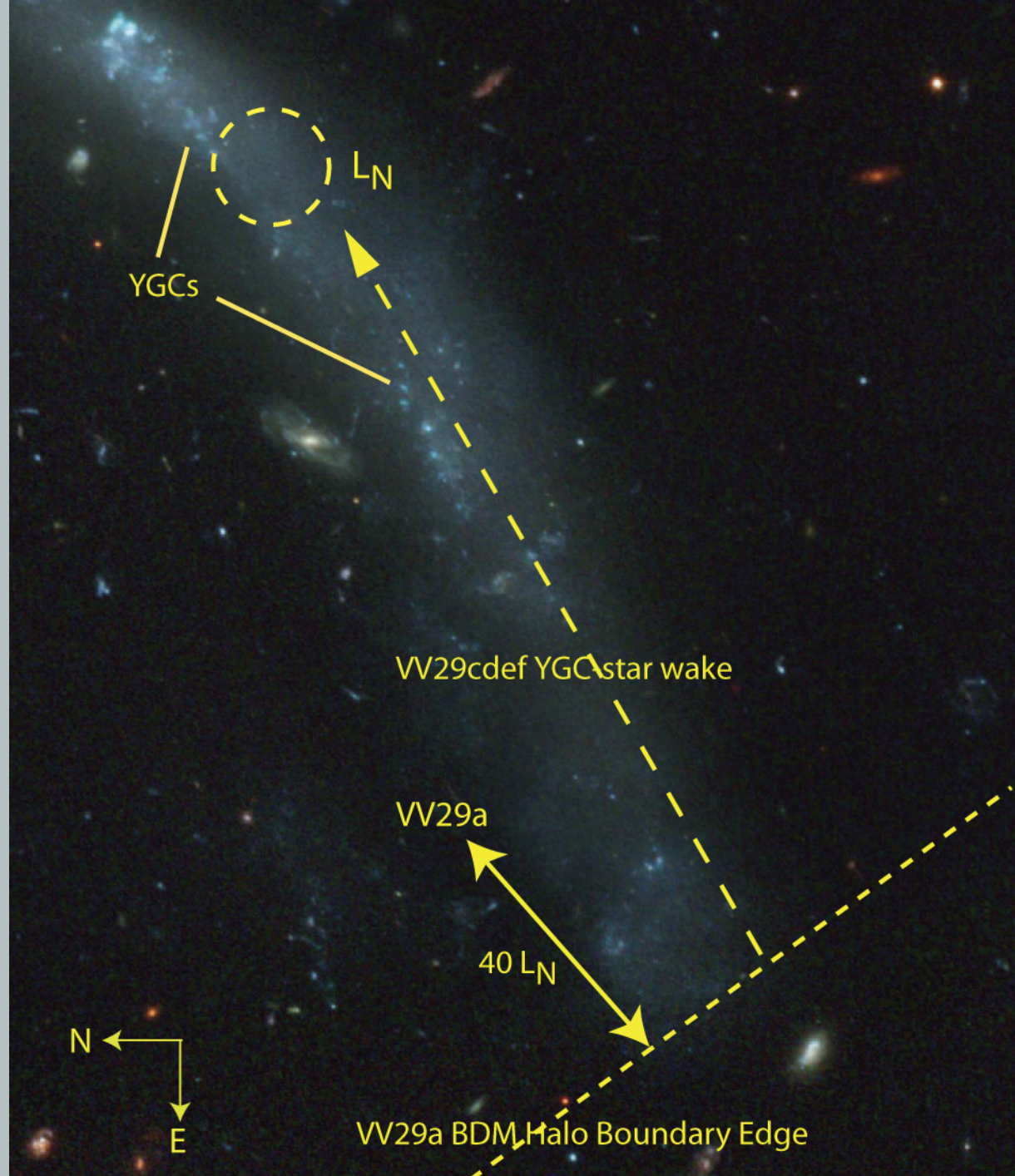


- Young globular star clusters
- Dozens of them in a precise row cannot be anything but a wake



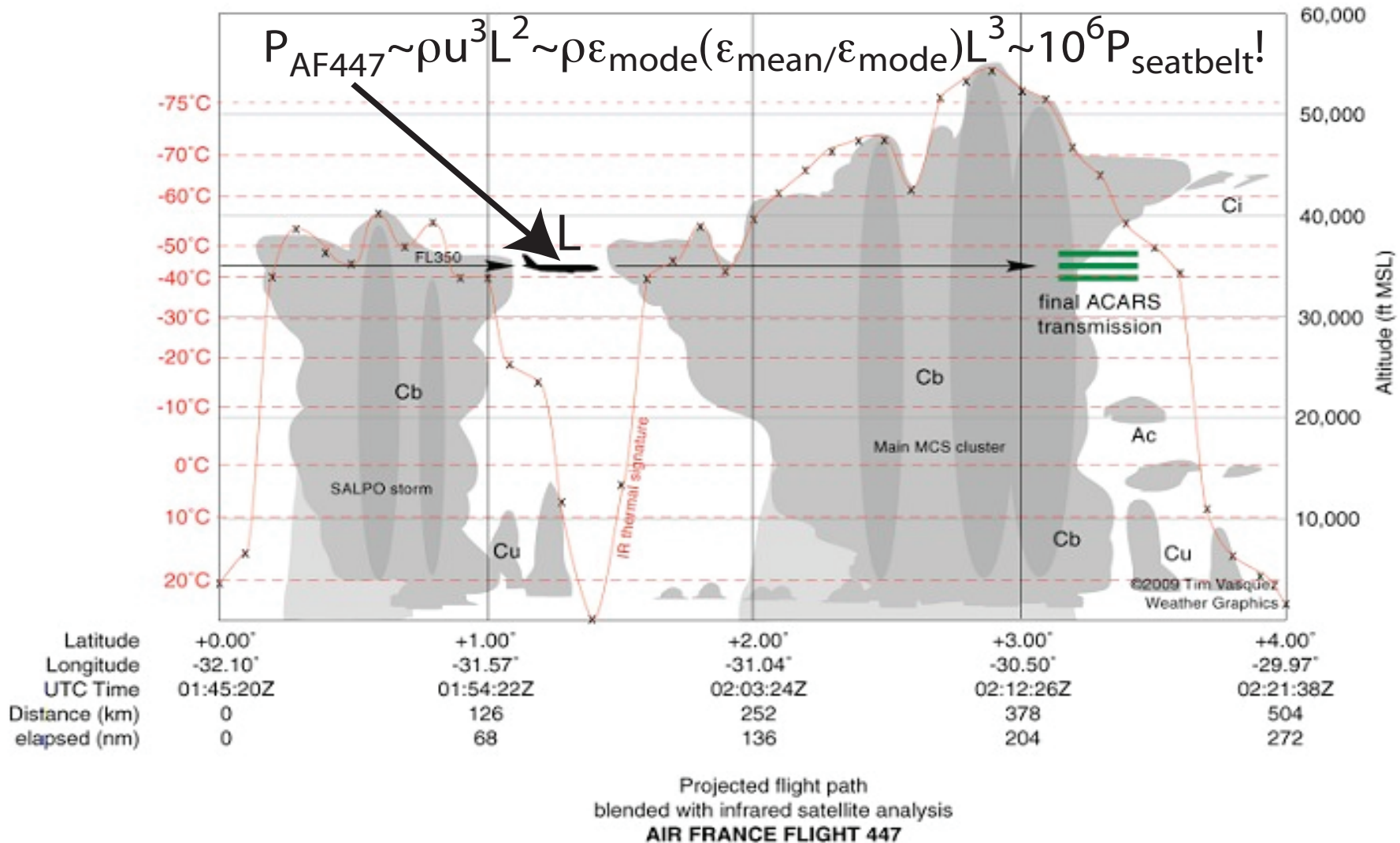
# The dark halo boundary

- ▶ *Stars are triggered to form young globular clusters*
- ▶ *The wake size  $L_N$  reflects the plasma protogalaxy scale*



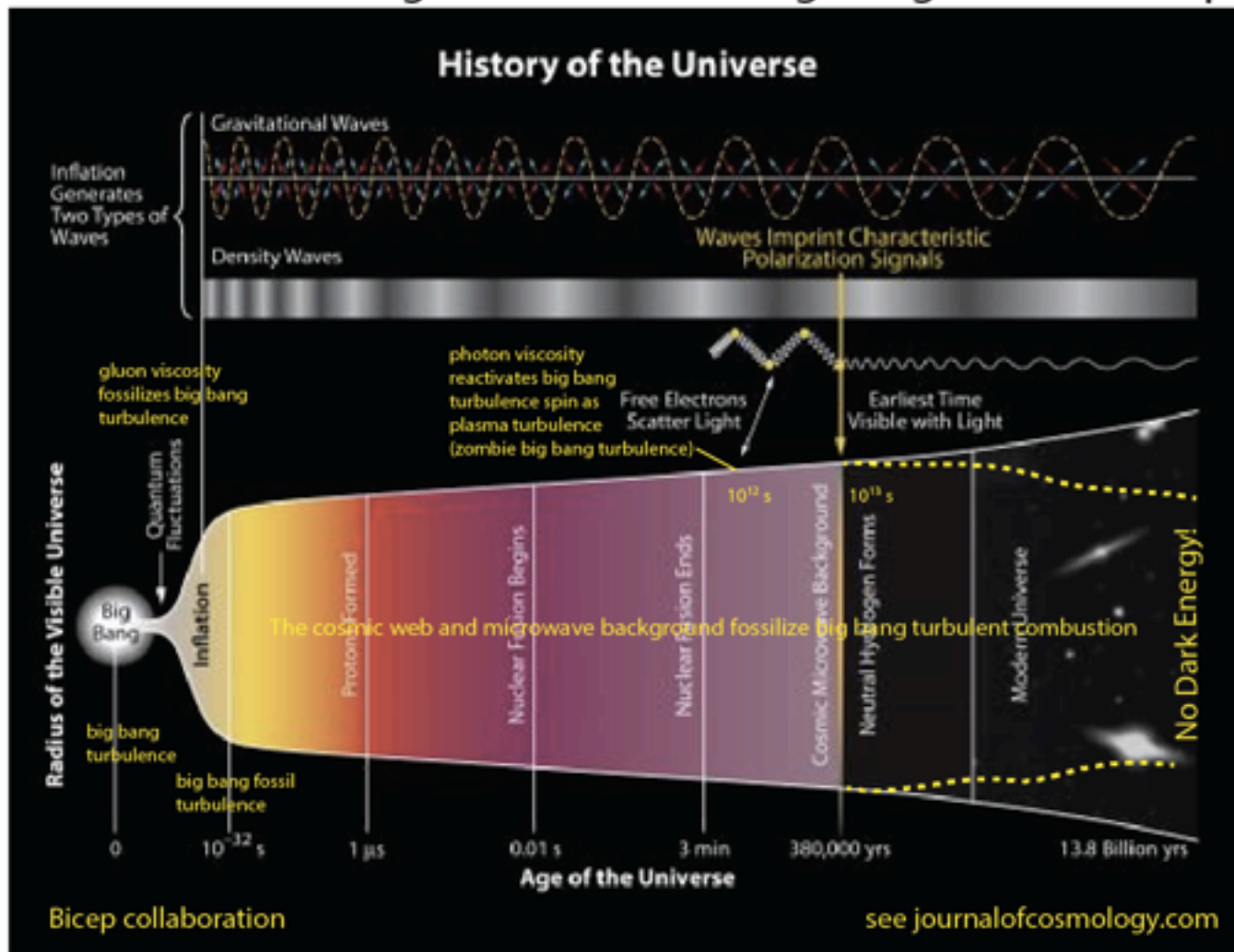


# Arithmetic mean $\epsilon$ values in ocean and atmosphere require many samples





# Polarization of CMB light reflects fossil big bang turbulence spin



Dark Energy is a systematic SNIa dimming error by the dark matter planets that form explosive carbon stars

Kepler 10-c exoplanet with 17 Earth mass and rock-iron density



Artist's impression: Scientists say the "mega-Earth"  
Kepler-10c has a density greater than our own world

Gibson, Carl H., Poster 2, Session A, 23 June 2014, IAU 308,  
Tallinn, Zeldovich and the cosmic web

Protogalaxy fragments move through a dark matter halo making stars by triggered mergers of dark matter planets

Kolmogorov scale ( $10^{20}$  m) of plasma  
at time of transition to gas,  $10^{13}$  s

galaxies are 97%  
baryonic dark matter

Protogalaxy

Kolmogorov scale ( $10^{14}$  m) of gas at transition  
was the size of the planets formed

Clumps of PGC clumps of dark matter planets move through  
the dark matter halo of NGC 5907