The definition of turbulence and the direction of the turbulence energy cascade

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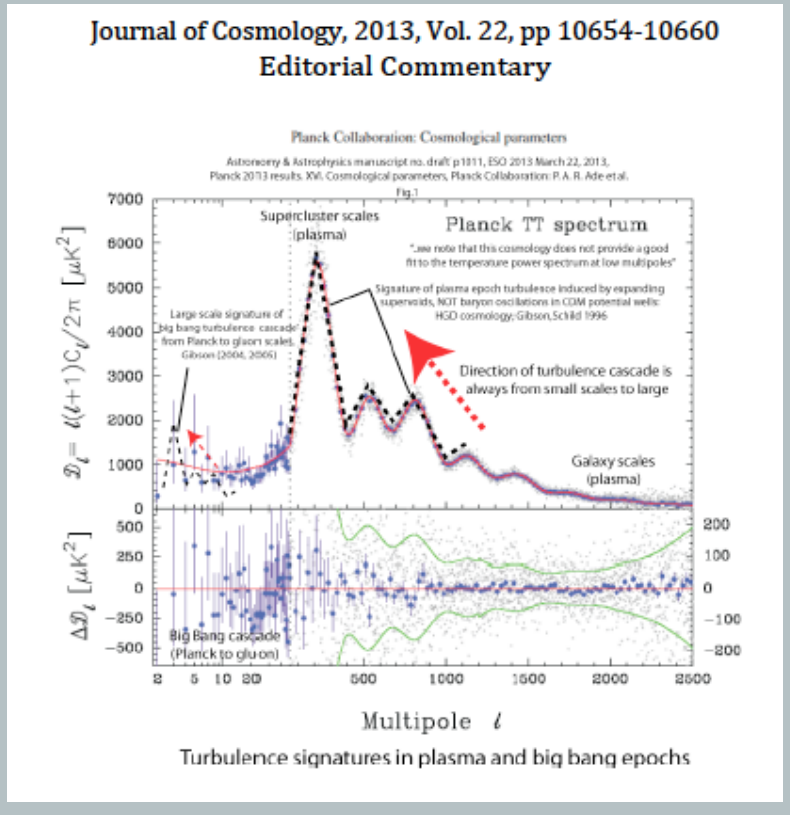
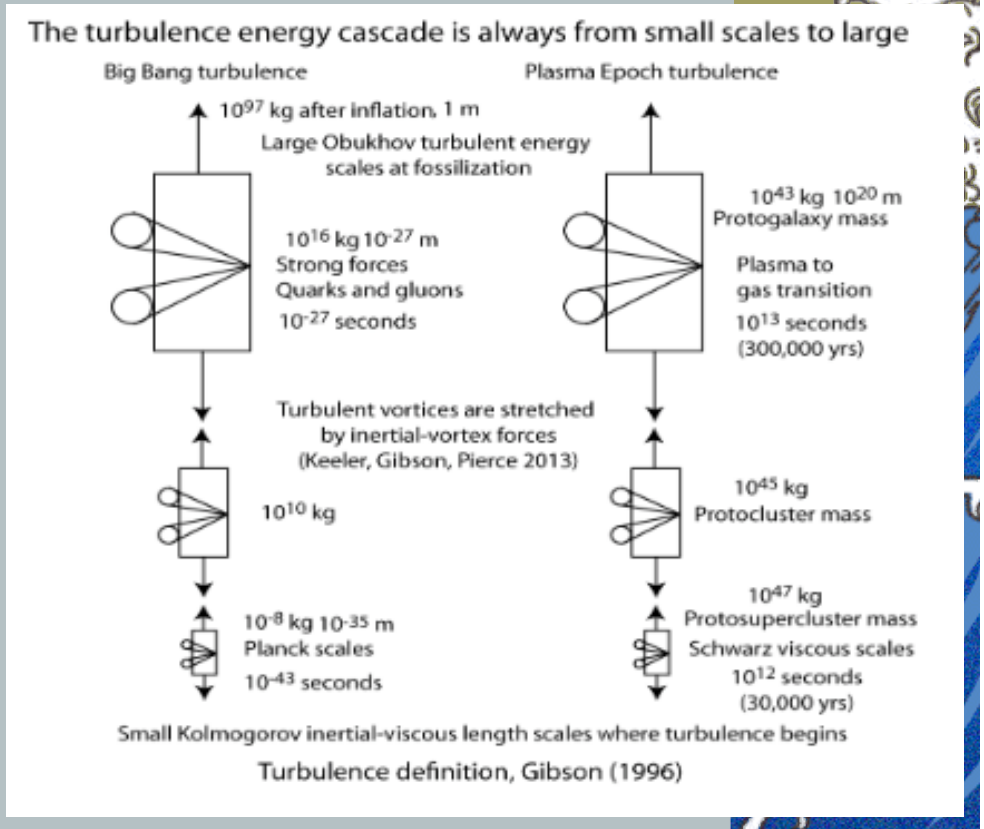
Outline

- *Definition of turbulence by vxw 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 (ΛCDMHC) does not provide a good fit for small monopoles…"



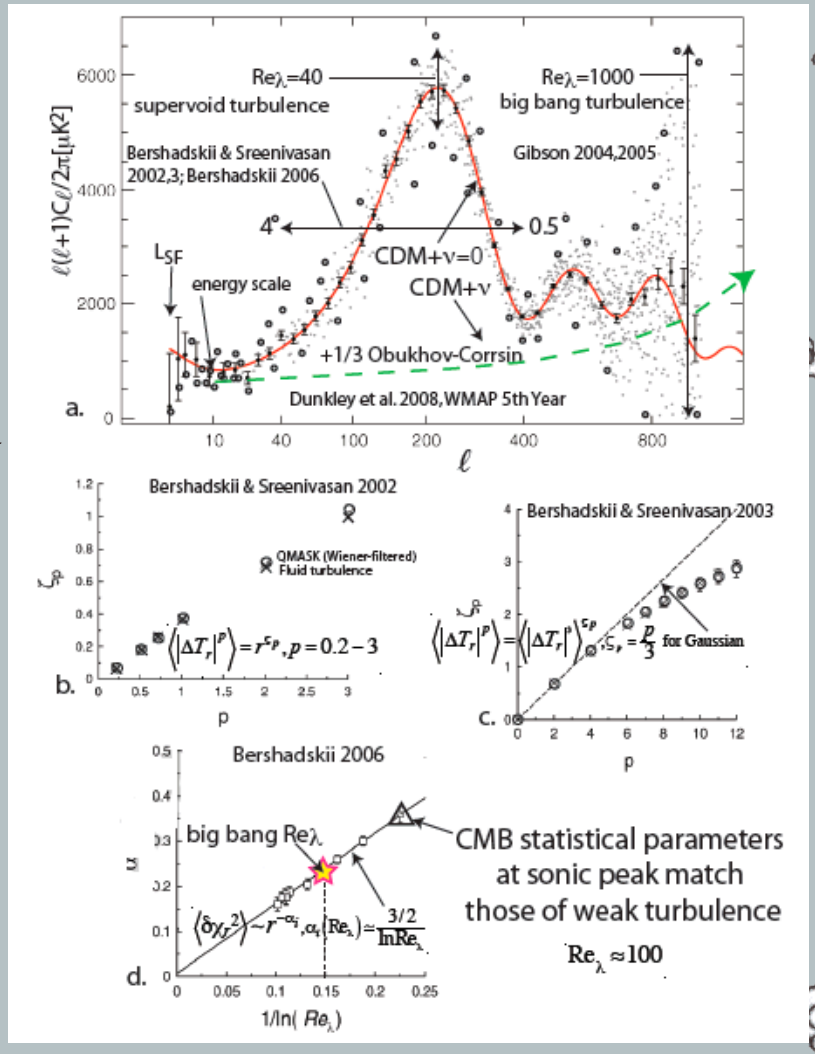


The plasma fragments at 10^{12} seconds

$ct \sim 10^{20}$ m $\sim(\gamma\nu/\rho G)^{1/2}$

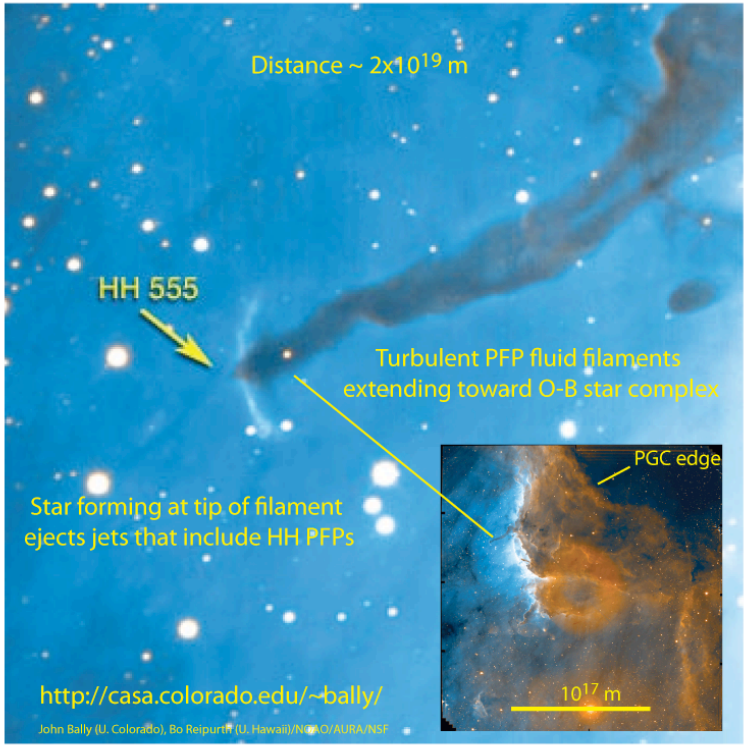
Fossils of supervoid and big bang turbulence detected in the cosmic microwave background (CMB)

- *Weak turbulence at supercluster void boundaries expands at sonic speeds ~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

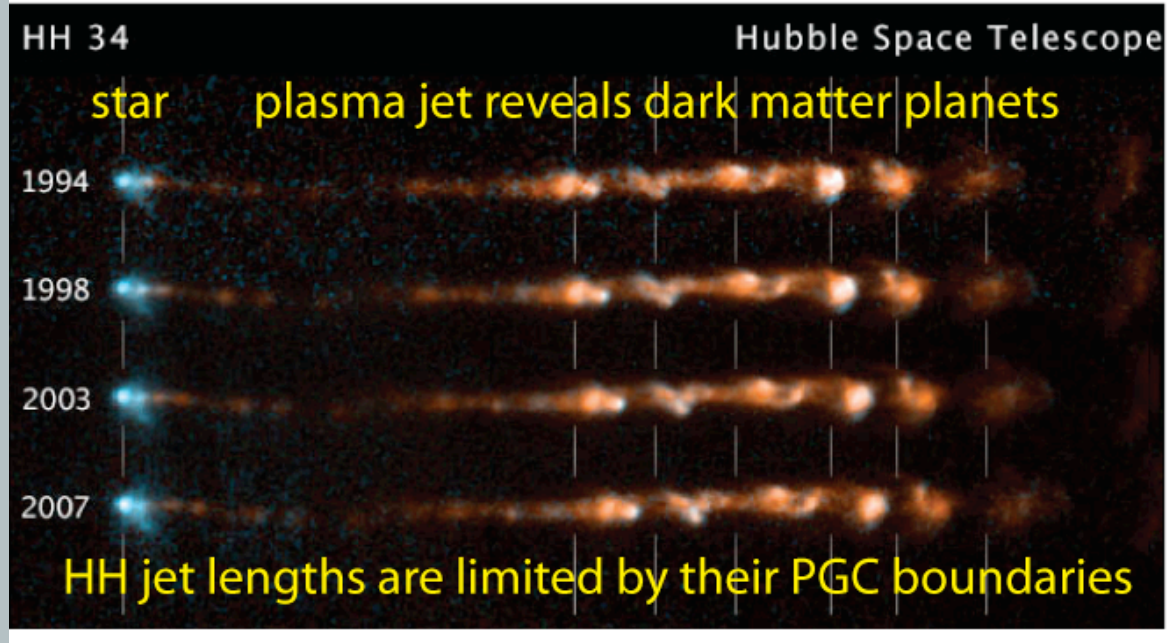
Dark matter planets appear as Herbig Haro objects as they form stars



Star formation reveals that the dark matter is clumpy at PFP and PGC scales

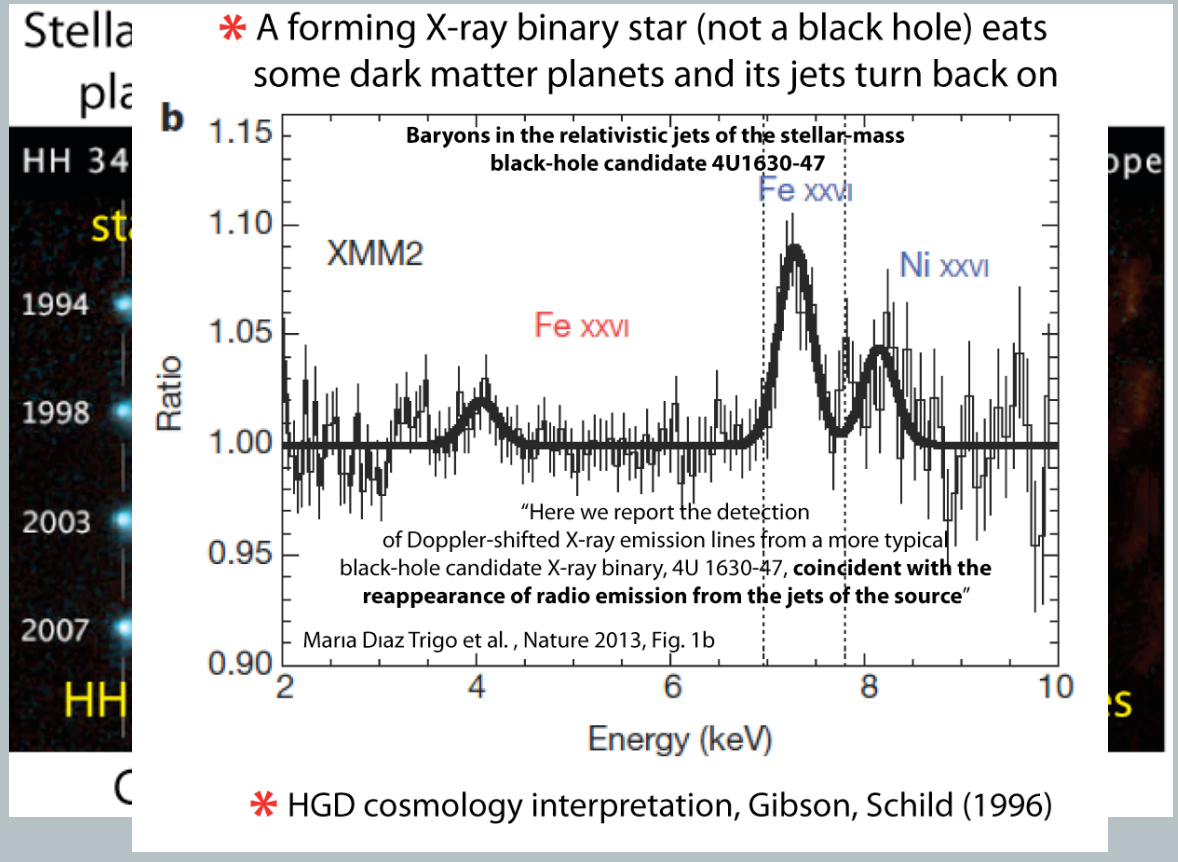
Intermittency of interstellar medium shown by star jets

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



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

Intermittency of interstellar medium shown by star jets



Turbulence in our local PGC clump of dark matter planets

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

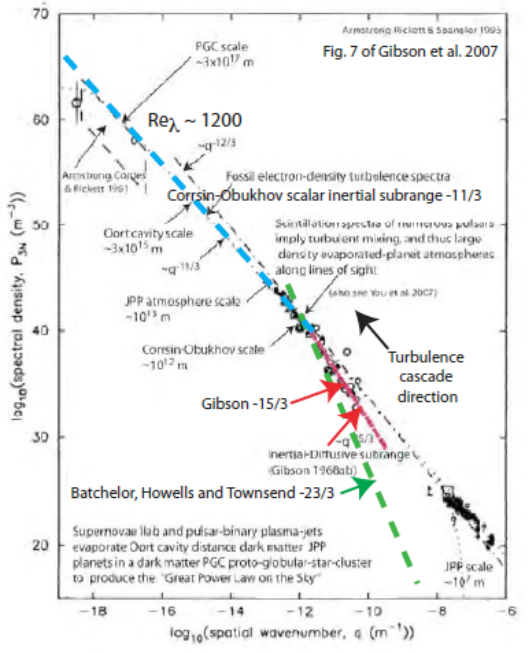


Figure 7. Application of BZTMA mixing theory to understand pulsar electron density fluctuation spectra and star formation from planets[7]. Jovian PFP (primordial –fog-particle) Planets (JPPs) comprise the baryonic dark matter of all galaxies and develop turbulent atmospheres when evaporated by radiation 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)

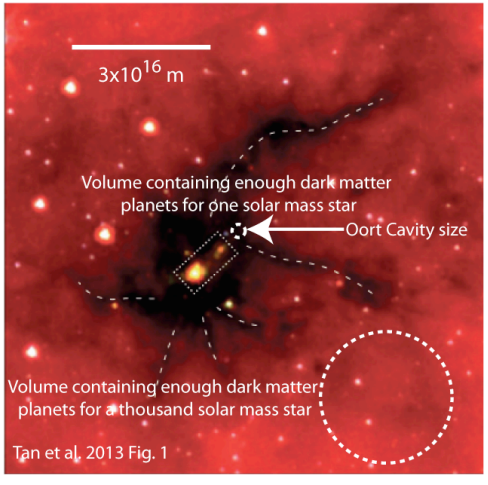
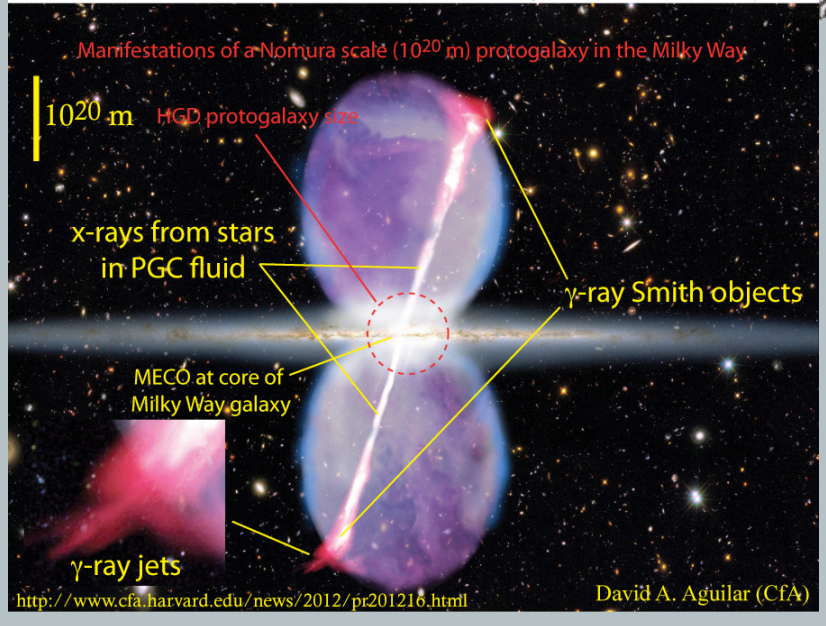


Figure 1 | Collapsing cloud. This infrared image of the SDC335 dark cloud was taken with the Spitzer telescope. Peretto *et al.*[2] find two massive gas cores (dotted box) near the cloud centre, coinciding with infrared sources, which are likely to be forming massive stars. A web of surrounding filaments (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

$$\partial \vec{v}/\partial t = -\nabla B + \vec{v} \times \vec{\omega}$$

$$+\vec{F}_{viscous} + \vec{F}_{buoyancy} + \vec{F}_{Coriolis} + \vec{F}_{other}$$

$$B = v^2/2 + p/\rho + lw$$

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

ossil 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

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Physical Mechanisms of BZTMA mixing chimneys

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

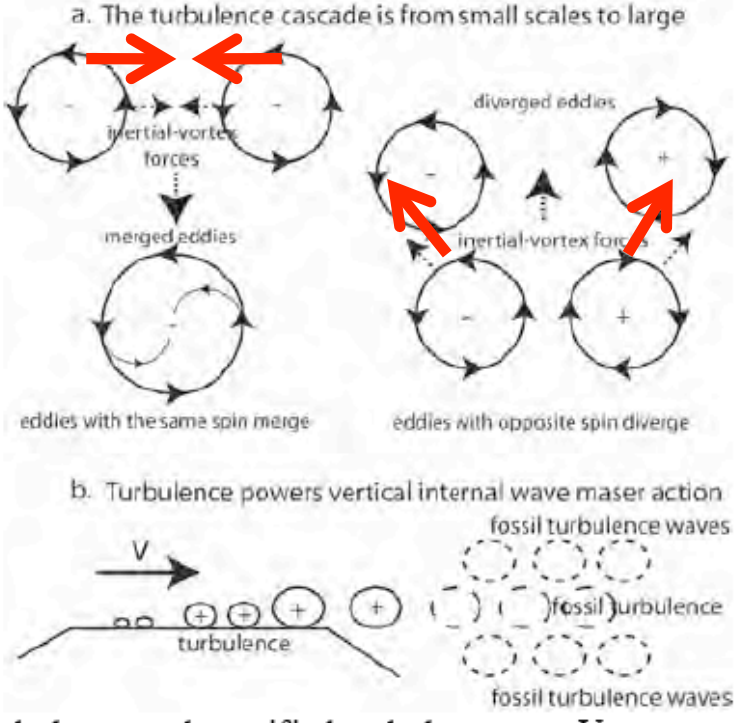
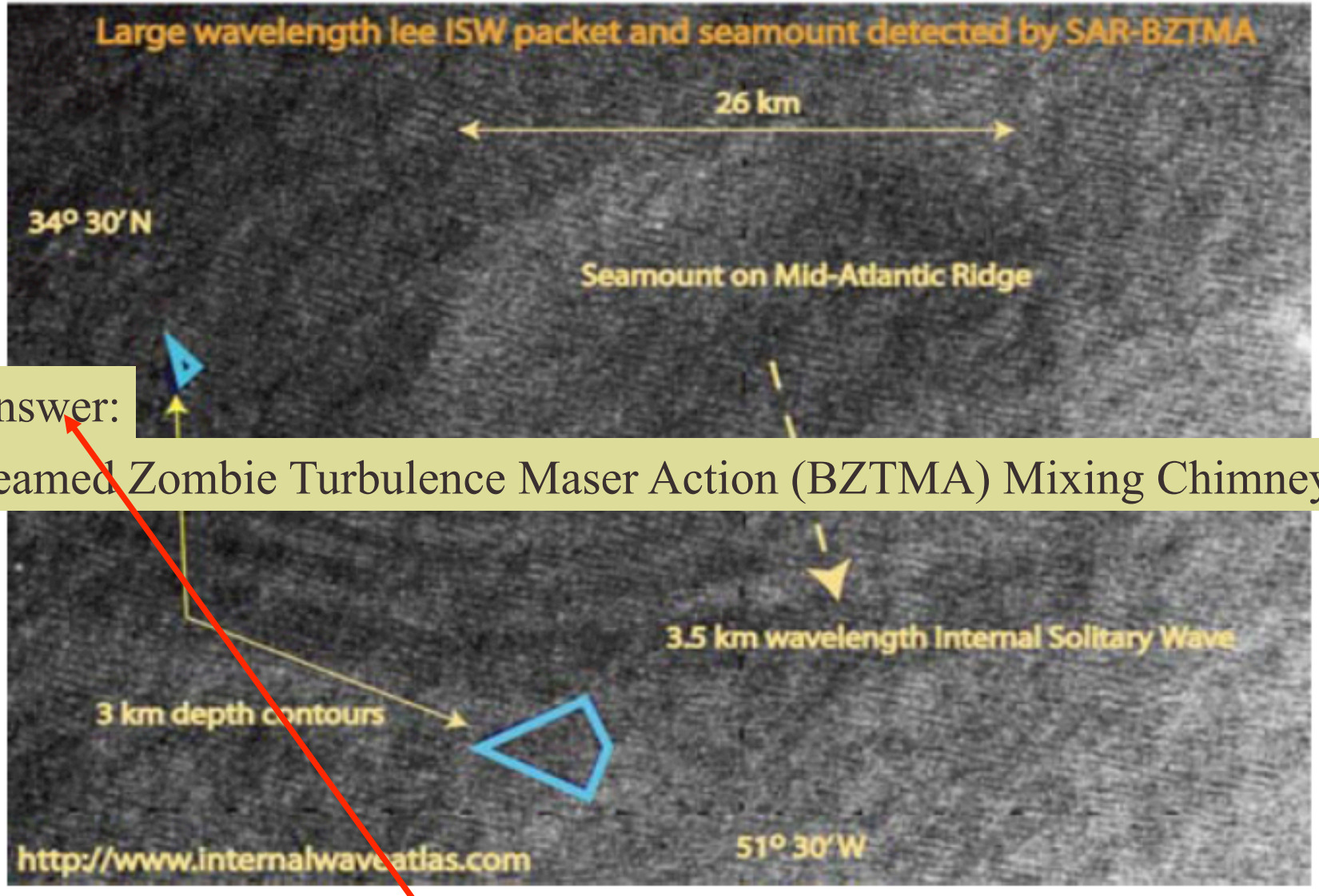


Figure 3. Physical mechanisms of turbulence and stratified turbulence. a. Vortex mechanisms of the turbulence cascade from small scales to large. Adjacent eddies with the same vorticity produce inertial vortex forces $\vec{v}\times\vec{\omega}$ (dashed arrows) that cause merging. Nearby eddies with opposite 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).

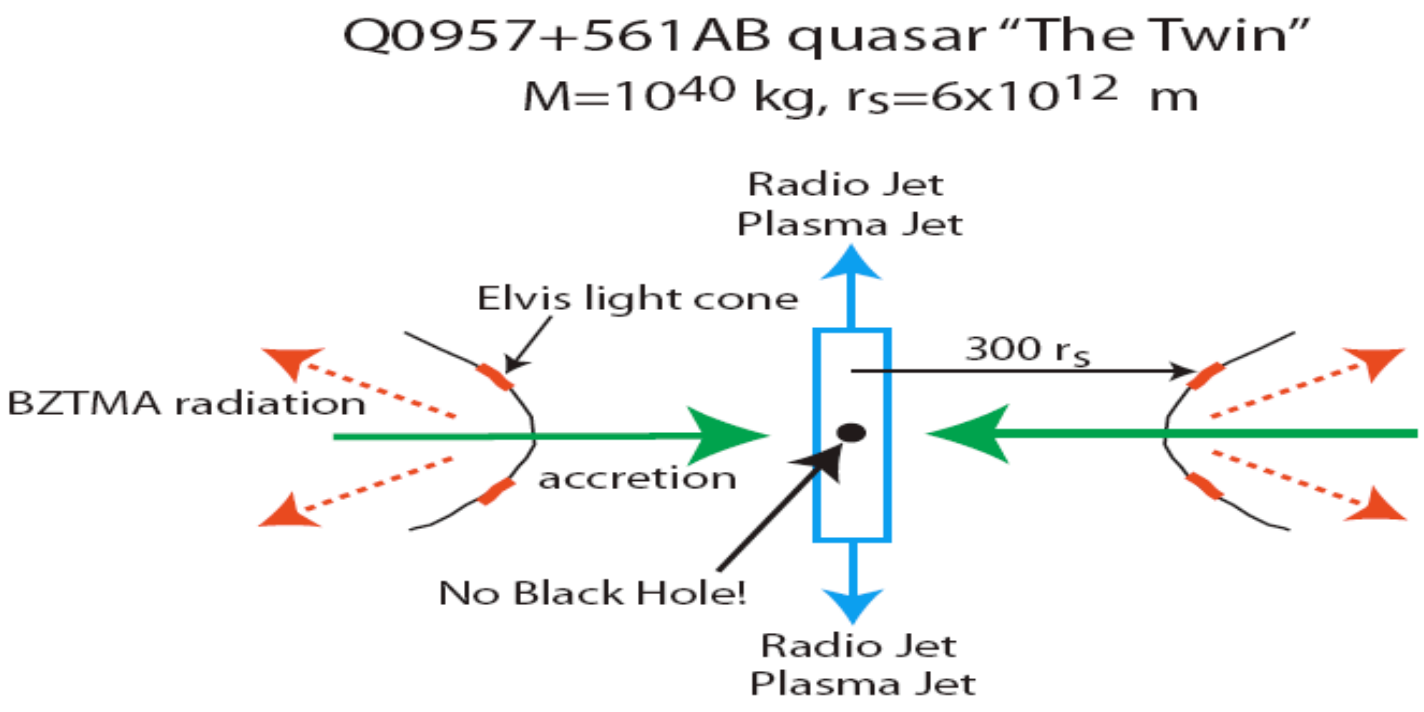


Answer:

Beamed Zombie Turbulence Maser Action (BZTMA) Mixing Chimneys

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

BZTMA-MECO or Black Hole?



BZTMA radiation in galaxy centers

Conclusions –new cosmology

1. *Hydro-Gravitational Dynamics (HGD) describes the gravitational structure formations of cosmology*
2. *The standard ΛCDMHC 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