Editorial Commentary

Plasma jets reveal the dark matter of galaxies as frozen gas planets in clumps

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ABSTRACT

Observations of plasma jets created where stars and galactic nuclei are formed show the interstellar medium is not just gas and dust as usually assumed, but is mostly frozen dark matter planets in clumps. Both the planets and the clumps are collisional, and can act as fluids, and even turbulent fluids.

INTRODUCTION

Many observations using modern space telescopes are found to be unexplainable using the standard ΛCDMHC model of cosmology. By this cosmology, stars are formed from gas and dust collected gravitationally by halos of condensed cold dark matter. The missing mass of galaxies is claimed to be mostly this non-baryonic CDM material, increasingly dominated by anti-gravitational dark energy. An alternative cosmology HGD (hydro-gravitational-dynamics) includes viscous, turbulent and diffusive effects of collisional fluid mechanics, Gibson (1996, 2004, 2005, 2010) and Schild (1996). The dark matter of galaxies is found to be primordial frozen gas planets in clumps, with a small non-baryonic component, ~ 3%, with no dark energy or antigravitational forces needed at any stage. Negative stresses needed to overcome gravity at Planck scales are provided by turbulence. Using a non-standard definition of turbulence that always cascades from small scales to large, the big bang event occurs naturally at Planck scales as a turbulence instability intrinsic to Planck conditions. The large spins and jets that arise when stars and galactic nuclei are formed is a consequence of the conservation of angular momentum and the initial big bang turbulence. HGD explains jet anomalies such as Herbig-Haro objects and Smith objects, which are treated as mysteries by ΛCDMHC.

THEORY

Star formation occurs in giant molecular clouds, identified by HGD cosmology as proto-globular-star-cluster PGC clumps of a trillion ~ earth-mass dark matter planets. The mass of each PGC reflects the Jeans mass at the plasma to gas transition (~ 10^{36} kg), and the mass of each planet (~ 10^{24} kg) reflects the viscous Schwarz scale[1] mass of the gas produced at this phase change event in the proto-galaxies formed at the last and smallest scale fragmentation of the plasma, Gibson (1996). These smallest objects were termed primordial fog particles PFPs. Schild (1996) for the first time showed the dominant point

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[1] $L_{SV} \sim (\gamma\nu/\rho G)^{1/2}$, γ is the rate-of-strain, ν is the kinematic viscosity, ρ is the density

mass object of a galaxy, gravitationally lensing a background quasar, had planetary rather than stellar mass, and therefore concluded planets comprised the missing mass of galaxies. Several consortia have failed to identify planets as the missing mass of galaxies because they have not recognized that the planets are in Jeans mass clumps.

Evidence that the dark matter of galaxies is planets is rapidly accumulating from the large number of space telescopes now available, and greatly improved ground based telescopes. New exo-planets (planets of stars other than the sun) are now easy to discover, especially very massive planets (Jupiters) at close orbits (0.1 AU) known as hot Jupiters. From HGD cosmology, Jupiters are formed by binary merging of dark matter Earths or PFPs, and stars are formed as binaries by merging Jupiters. PGCs are in a persistent state of metastable equilibrium. By collisional fluid mechanics, PFPs may serve as fluid particles within a PGC, and PGCs may serve as fluid particles within a galaxy.

OBSERVATIONS

Recent evidence of PGC clumps of planets as fluid particles is shown by the detection of globular star clusters GCs in the nearby supercluster Abell 1689, K. A. Alamo-Martinez et al. (2013). The dots in Figure 1 are GCs, and there are 163,000 of them in this supercluster, compared to only 200 identified in the Milky Way.

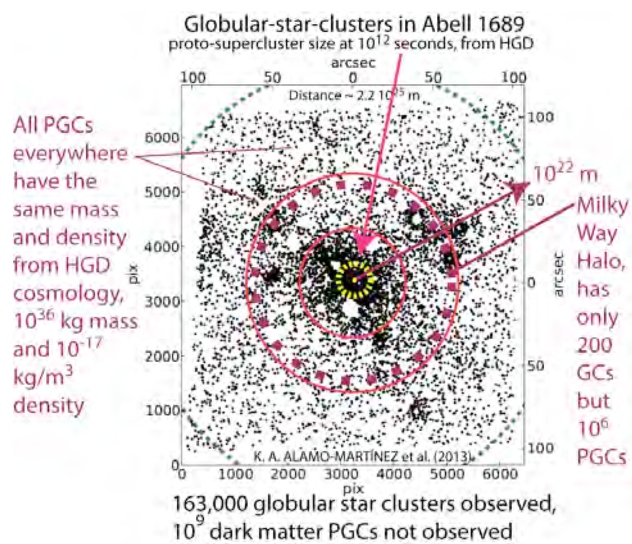

Figure 1. Globular clusters detected in supercluster Abell 1689 by K.A. Alamo-Martinez et al (2013) show how the GCs have diffused uniformly from their galaxies after their planets freeze. From HGD cosmology, the initial supercluster size was ~ ct ~ 10^{20} m shown by the yellow dot, and expanded to Milky Way galaxy size 10^{22} m (green circle) by the time of detection.

Several aspects of Fig. 1 favor an interpretation in terms of HGD cosmology rather than ΛCDMHC. As noted in red, all PGCs everywhere have the same mass and density, reflecting the baryonic density existing at 10^{12} seconds when the decreasing photon viscosity first permitted fragmentation during the plasma epoch to produce superclusters and supercluster voids. The dashed yellow circle is the supercluster scale 10^{21} m at 10^{13} seconds and the yellow dot is the protogalaxy scale (Nomura scale) 10^{20} m. At present, supercluster scales are ~ 10^{24} m and supervoids have been seen as large as ~ 10^{25} m. Condensations of galaxies to form clusters, as predicted by the standard model, are not observed. Voids between ~10^{22} m galaxies are much smaller than the observed >10^{25} m void sizes because they are formed last rather than first, as predicted by HGD cosmology.

Figure 2 shows a time sequence of Herbig-Haro object 34 by the Hubble Space Telescope from 1994 to 2007, collected by P. Hartigan et al at Rice University. From HGD cosmology the moving objects are PFP or larger frozen dark matter planets that have been at least partially evaporated by the accretion disk plasma jet formed at the protostar. Shocks form upstream and downstream of the intermittent objects, suggesting some have originated at the star and some have been entrained from the interstellar medium.

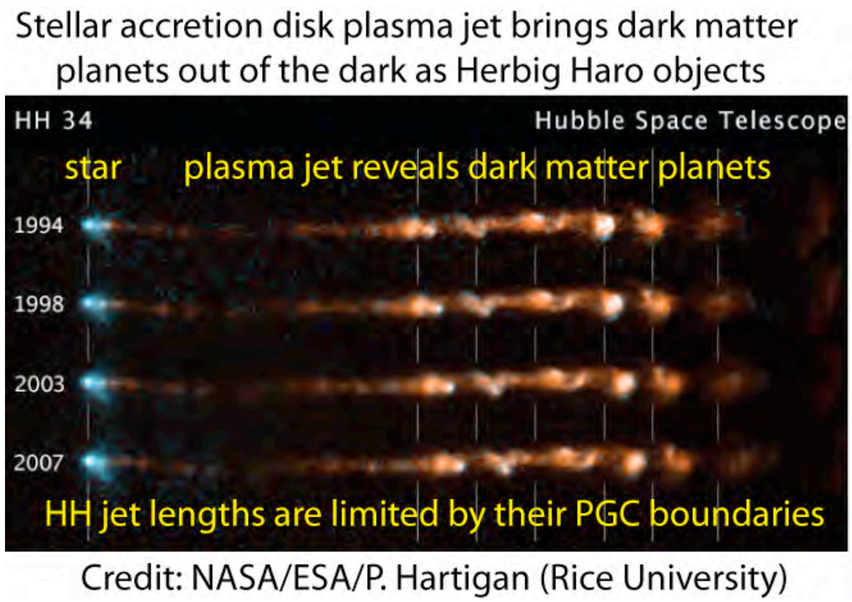

Figure 2. A complex mechanism involving dynamo forces from an inclined accretion disk produces Herbig-Haro plasma jets from the interstellar medium. If the interstellar medium were uniform gas and dust, no HH objects should form.

Figure 3 shows Herbig-Haro object 555, from the Pelican nebula in Cygnus, at a distance of ~ 2 x 10^{19} m. This distance places HH 555 far outside the Milky Way PGC, since PGCs have sizes ~ $3x10^{17}$ m, according to HGD cosmology. A sharp boundary is seen at the border of the PGC. The interstellar medium appears to be loaded with life infested planets, judging from the opacity to optical frequencies from PAH (polycyclic aromatic hydrocarbon) molecules emitted when stars are formed from dark matter planets with all the carbon converted to these distinctive and recognizable organic chemicals produced by the living organisms, Gibson, Schild and Wickramasinghe (2011) and Gibson, Wickramasinghe and Schild (2010).

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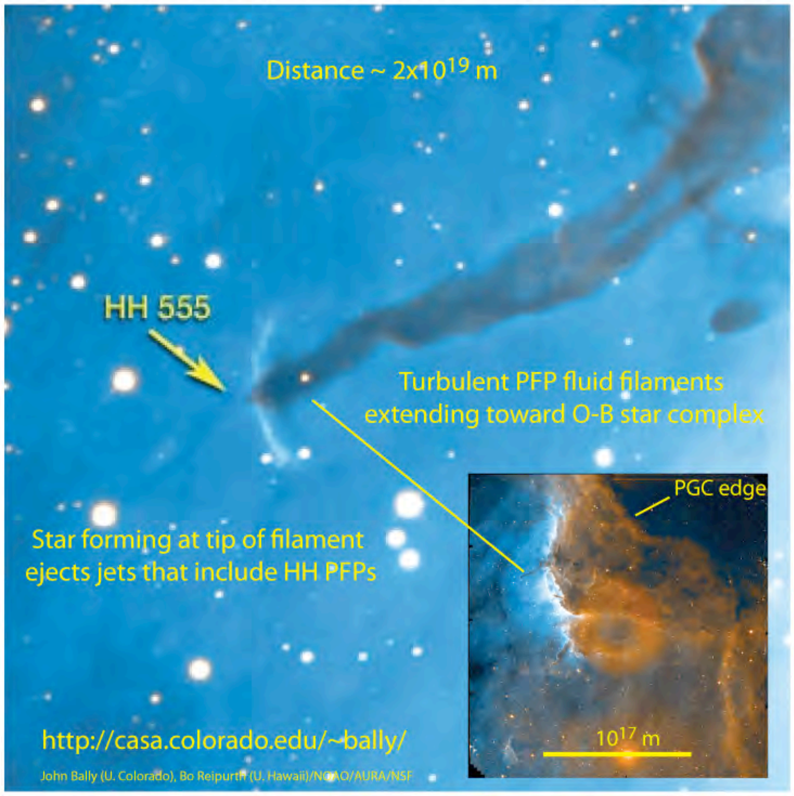
Dark matter planets appear as Herbig Haro objects as they form stars



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

Figure 3. Herbig-Haro object 555 suggests the interstellar medium must be lumpy at planetary scales rather than continuous gas and dust. The $\sim 10^{14}$ m scale of the lumps is small compared to the $\sim 10^{15}$ m accretion disk scale of the young star forming at the tip of the extrusion filament. The 10^{17} m scale was inferred from the press release.

A sharp boundary is seen at the edge of the Pelican PGC. From HGD cosmology, the extrusion filament formed from the dense PFP dominated fluid falls toward a massive O-B star complex to the left (not shown: left is East, North is up) as a pair of turbulent vortex lines with the same spin merging by inertial vortex forces. Further evidence of PGC scale lumpiness is shown in Figure 4.

Figure 4 shows evidence of PFP turbulent filaments moving mass toward an OB star complex, Tan (2013). Numerous bright (probably not massive) stars increase the average density of such regions to values > 10^{-12} kg m^{-3}, much larger than the PGC density of $\rho \sim \rho_0 \sim 10^{-17}$ kg m^{-3} characteristic of GCs and PGCs, which is a fossil of the time of first fragmentation in the plasma epoch. Dashed filament lines converge on the OB stars. Inertial vortex forces compress the vortices and will trigger planet mergers and star formation in the PFP fluid.

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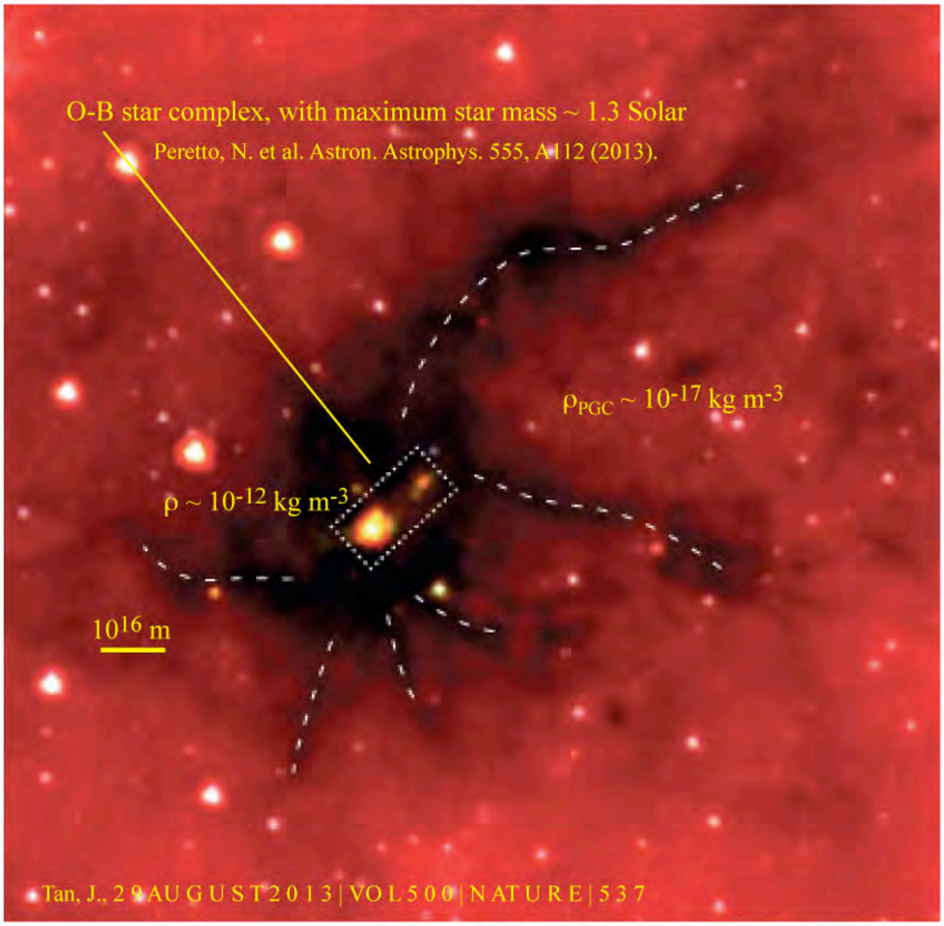
Bright (not massive) stars are formed by converging turbulent PFP vortex lines



Infrared image from Spitzer Space Telescope shows the SDC 335 dark cloud interior

Figure 4. Tan (2013) presents evidence of OB star formation as though the stars were massive, rather than simply extremely bright. Dashed line filaments are interpreted from HGD cosmology to be PFP fluid turbulent vortex lines, draining into a dense region of O-B stars. The density (best estimate) is ~10^5 greater than that of GCs and PGCs. Massive star formation is questionable for densities < 10^{20} greater than ρ_0, the density of star merger.

The interior of the dark cloud SDC335 is studied by Peretto et al. (2013). Filamentary structures shown by dashed lines are interpreted by HGD cosmology as converging turbulent vortex filaments of PFP fluid. Because supernova II precursor stars become unstable at ~ 1.3 solar mass (the mass of a pulsar), the O-B stars are interpreted as extremely bright, but not necessarily massive. Whether massive stars > 1.44 solar exist or have ever existed, for example as the Population III superstars, is debatable. From HGD cosmology, they never happen.

Figure 5 shows the x-ray and γ-ray images of plasma jets emitted by the central core of the Milky Way galaxy. A dashed red circle shows the ~10^{20} m size of the protogalaxy. The mass of this region is continually increasing by accretion of PGC clumps of dark matter planets, according to HGD cosmology. Rather than a black hole that does not radiate, a MECO (magnetosphere eternally collapsing object) emits a plasma jet with power depending on the rate of PGC accretion (Schild et al. 2006). Previously, like most galaxies, the Milky Way presumably experienced a quasar phase with an extremely powerful plasma jet extending to distances far beyond the ~ 10^{22} m galaxy halo scale.

The present plasma jet is much weaker than that of the quasar phase, and has only recently been detected. As with the Herbig-Haro objects shown in Fig. 2 and 3, stars are triggered into formation from the dark matter clumps of PFP planets along the jet, and by the powerful radiation from the stars of the jet. Particularly powerful rates of star formation and high mass densities occur at the end of the jets, producing γ-ray jets from these remarkable features, termed Smith objects.

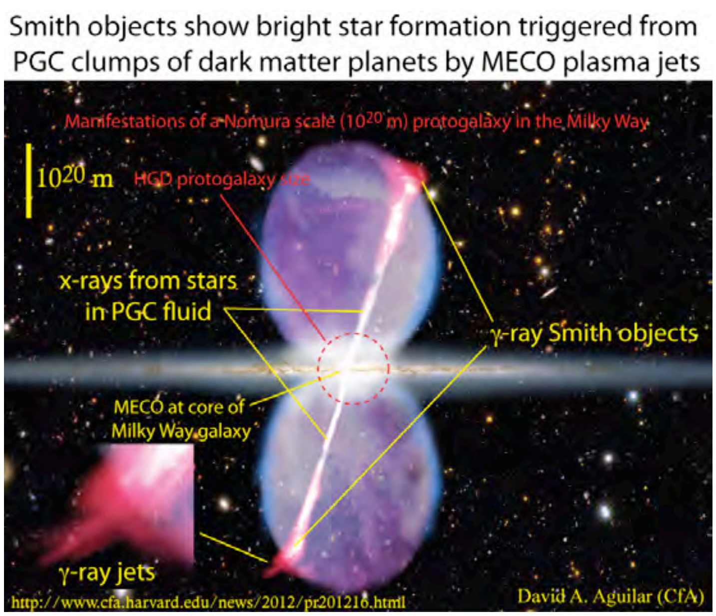


Figure 5. Plasma jets reveal accretion of PGC fluid from the Milk Way protogalaxy region. The x-ray radiation is of intermittent brightness along the jet, revealing the clumpiness of its source, just as HH objects reveal the existence of PFP dark matter fluid particles.

CONCLUSIONS

Careful filtering has permitted detection of globular clusters of a massive supercluster of galaxies Abell 1689 in Figure 1, confirming the HGD cosmology model that the dark matter of all galaxies is proto-globular-star-cluster clumps of Earth mass planets. Clearly the standard ΛCDMHC model must be abandoned.

Plasma jets associated with the formation of young stars are examined, and compared to the plasma jet associated with the central massive object of the Milky Way galaxy. Evidence of intermittency in Herbig-Haro objects supports the HGD cosmology claim that the dark matter of galaxies is planetary mass objects in clumps of a trillion primordial gas planets. The planets are frozen primordial gas, and are sufficiently collisional on evaporation to serve as fluid particles. Figures 2, 3 and 4 show that the material forming stars is not a homogeneous mixture of gas and dust, as predicted by the standard models of star formation, but is dominated by point mass objects that evaporate like gas planets and may form turbulent vortex lines.

Similarly, the plasma jet of the Milky Way center supports the HGD cosmology claim that all galaxies formed at the plasma-gas phase transition as Nomura scale protogalaxies. Smith objects emitting γ-rays are observed in Figure 5 analogous to HH objects. Bubbles reflecting the protogalaxy scale $\sim 10^{20}$ m form from x-ray emissions of bright stars triggered in the plasma jet, taken to be driven by accretion of a fluid formed from collisional PGCs by the central MECO. The viscosity of the PGC fluid matches that inferred from self-interacting-cold-dark-matter numerical simulations, and provides a baryonic physical basis for the concept. More powerful quasar jets should be examined for evidence of PGC fluid turbulence.

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