

Novel Effects of Significant Spatial Interaction with Mass

Short Title: Space/Mass Interaction

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ABSTRACT

The preceding paper proposed that black holes (BH) gravitationally capture space and release it when they interact with each other or are destroyed in the big bang. This note describes some less dramatic effects of: BH spatial capture, a general attraction of space to mass and an intrinsic property of space to expand:

1. Space captured by super massive black holes (SMBH) reduces spatial expansion pressure (an attribute of space itself) in the vicinity of galactic filaments. This local slowing, from normal rates of spatial expansion, maintains and sharpens these filaments. As empty-space regions expand more rapidly than space within filaments, they nudge galaxies to maintain and sharpen the filaments.
2. Space, within galaxies and galactic clusters, rotates in the direction of individual galaxies or galactic clusters. This rotation reduces galactic or cluster rotation speeds, within to their local spatial reference, and thus it maintains stable stellar orbits within the galaxies and stable galactic orbits within their clusters.
3. As the universe expands, galactic, spatial rotation rates increase due to weakened connections with the universal space grid. These faster rotations of the galactic spatial grids promote eventual galactic collapse into ultra massive black holes (UMBH). These UMBH now contain their original SMBH, galactic masses and the added relativistic mass acquired by galactic mass as it fell through the crushing gravity of UMBH.
4. The significant new relativistic mass added to UMBH above and beyond the combined masses of the galaxy and its central SMBH increases mutual UMBH attractions to initiate universal collapse.

Thus spatial expansion, as a fundamental attribute of space itself, explains both big bang inflation and continued universal expansion (without dark energy). And spatial attractions to galactic or cluster mass rotate space within these entities to maintain stable internal orbits despite our observations of higher-than-stable galactic or cluster orbital speeds (without dark matter).

1. GALLACTIC FILAMENTS

The early appearance of SMBH and their associated galactic masses enabled them establish associations before the universe expanded to a point that galaxies would have little influence on their neighbors' movements. The galactic filaments that we see today (Figure 1) are the end result of early galactic associations *and* more recent spatial movements toward the filaments to maintain and sharpen them. Inter galactic gravity seems too weak and undirected to hold galaxies in organized filaments. However, spatial movement from empty regions toward filaments would keep them sharp and distinctive. This movement occurs because space is being swallowed up by the SMBH at the center of each galaxy within the filament and, to a lesser extent, by stellar mass BH (stBH) scattered throughout the galaxies. This process reduces spatial presence in the vicinity of filaments; and, to the extent that expansion pressure is an intrinsic property of space, this reduced spatial presence slows spatial expansion within the filaments.

Space seems to have the properties of a stiff gaseous lattice: It expands to fill voids that appear near black holes, at the same time that it strains to maintain a consistent 3-D lattice over inter galactic distances. Thus as space moves to compensate for the space lost into BH, it pushes broad swaths of space toward galactic filaments that had previously captured some of their nearby space.

2. INTRAGALACTIC AND INTRACLUSTER SPACE

Just as large-scale spatial movement maintains and sharpens galactic filaments, smaller-scale spatial movement also affects stellar orbits within galaxies and galactic orbits within clusters. The attraction of space to mass likely causes space, within a galaxy or a galactic cluster, to rotate in the direction of stellar or galactic orbits. This movement represents a competition between spatial stiffness and its attraction to mass. Any rotation of space, with a galaxy or galactic cluster, moves their spatial reference with them and reduces the disparity between observed galactic or cluster rotation speeds and the lower rotational speeds consistent with stable stellar or galactic orbits, given observed galactic or cluster mass. The stBH within each galaxy or SMBH within clusters give additional encouragement for the "local" spatial framework to follow galactic or cluster rotation. To the extent that the implied galactic rotational gravity (gravity needed for stable stellar orbits) exceeds galactic attractive gravity, a

rotating galactic spatial reference may explain part of the discrepancy. And similarly, to the extent that the implied cluster rotational gravity (gravity needed for stable galactic orbits) exceeds cluster attractive gravity; a rotating cluster spatial reference may explain part of that discrepancy as well.

High-speed stellar orbits within galaxies and galactic orbits within clusters are the likely result of spatial expansion. Although galactic space expands more slowly than void space because galactic space is less present due to constant spatial loss into their central SMBH, it still expands. Reduced spatial presence, in the sphere above and below the galactic disk, also reduces the strength of ties to the universal lattice and facilitates rotation of space within the galactic plane to follow galactic rotation. Similar arguments apply to galactic clusters, which orbit about an astonishingly massive ($\sim 10^{12}$ solar mass) black hole (AMBH). These clusters engulf significant void spaces between their galaxies, and these void spaces expand at the faster, void-space expansion rates.

Note that this system of shifting spatial rotation within a galaxy or within a cluster is a dynamic system that can adjust to fit changing circumstances brought on by spatial expansion. Dark matter represents a static system that cannot adjust its gravity to accommodate the increasingly "faster" stars or galaxies traveling in their new and expanding orbits (due to spatial expansion) within a galaxy or galactic cluster. Spatial expansion maintains original stellar or galactic speeds so that they appear to move "faster" in their new, expanded "slower" orbits within galactic disks or galactic clusters. Thus (without a changing reference) stars and galaxies would move ever faster than would be consistent with their observed orbits -- given their galactic or cluster mass. Fortunately, the spatial references, within the galaxies and clusters, can also rotate faster to accommodate these new, faster-than-necessary orbit speeds and keep local orbit speeds appropriate within the moving space of their respective groups.

4. GALACTIC AND UNIVERSAL COLLAPSE

Hypothetically, galactic spatial rotation, carried forward in time, may begin events that culminate in both galactic and ultimately universal collapse. As the universe expands, ties between a universal reference frame and rotating galactic space weaken faster than galaxies expand. (Spatial framework weakens as universal volume expands; whereas, galactic expansion is slowed due to reduced spatial presence due to spatial acquisition by their central SMBH.) This weakening allows rotating galactic space to turn faster and move closer to galactic rotational speeds. As rotating space moves faster, galactic stellar rotation speeds are effectively reduced with regard to their galactic orbits – thought they do not change

speed to an observer. Loss of internal galactic orbital speed thus begins the process of galactic collapse. As galaxies collapse, their orbiting mass falls into their central SMBH, which then become an ultra massive BH (UMBH), as they acquire the mass of their associated galaxies. In addition to galactic mass, UMBH also acquire the added relativistic mass (which adds significantly to the total mass) of all objects falling into them. Thus the gravitational attractions of newly formed UMBH significantly exceed the combined attraction of their former SMBH and galaxies. This significant increase of gravitational attraction as galaxies become UMBH, may be enough to reverse universal expansion and begin its collapse. The above scenario is one answer to the question of how galactic and universal collapse might occur.

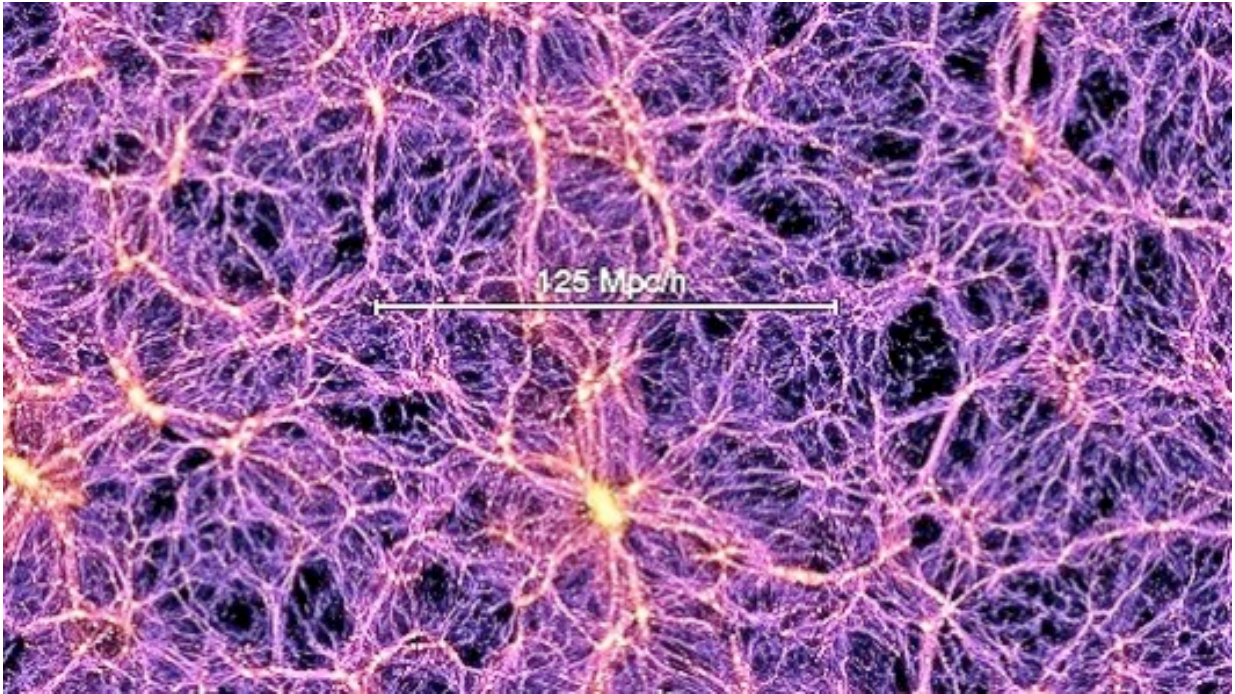


Figure 1. Galactic Filaments; Optical/UV: NASA/STScI; Radio: NSF/VLA/CfA/D.Evans et al., STFC/JBO