Probable Results of Significant Spatial Interactions with Mass

Short Title: Spatial Interactions

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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 universal spatial expansion pressure (an attribute of space itself) in the vicinity of galactic filaments and clusters. This local reduction, from normal spatial expansion, maintains and sharpens these structures. Thus empty-space regions expand more rapidly to nudge galaxies and maintain these intergalactic filaments and clusters.
2. Space, within galactic disks, rotates in the direction of galaxies to reduce galactic rotation speeds (relative to their local spatial reference) and maintain stable stellar orbits within the galaxies.
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), which now contain their galactic masse.
4. Galactic collapse into an UMBH adds significant relativistic mass to it – above and beyond the combined masses of the galaxy and its central SMBH. This added relativistic mass increases mutual UMBH attractions to initiate universal collapse.

Thus spatial expansion, as a fundamental property of space itself, explains both big bang inflation and continued universal expansion (without dark

energy). And spatial attractions to mass explain observed higher-than-stable galactic orbital speeds (without dark matter).

1. GALLACTIC FILAMENTS AND CLUSTERS

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 filaments and clusters that we see today (Figure 1) are the end result of early galactic associations *and* more recent spatial movements that 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 and clusters would tend to keep them sharp and distinctive. This movement occurs because space is being swallowed up by the SMBH at the center of each galaxy and, to a lesser extent, by stellar mass BH (stBH) scattered throughout them. This process reduces spatial presence in the vicinity of filaments and clusters; and, to the extent that expansion pressure is an intrinsic property of space, reduced spatial presence reduces spatial expansion in these regions.

Space seems to have the properties of a stiff gaseous lattice: It tries to expand to fill voids that appear near black holes, at the same time that it maintains its original 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 the filaments and clusters of galaxies that previously captured some of their nearby space.

Galactic clusters may result from the presence of a monster massive black hole (MMBH). MMBH are the product of BB mass accumulations falling into a rare UMBH that somehow survived the BB detonation (along with many stBH that are ~8 orders of magnitude smaller than a UMBH). If these surviving UMBH accumulate mass and energy at the same relative rates as stBH, they could emerge from the BB plasma cloud as MMBH, weighing ~10^{14} solar masses. These monsters would exert gravitational influence over cluster sized volumes of space and preclude normal galaxy formation around them. They would also serve as likely trigger points for the next BB.

2. INTRAGALACTIC SPACE

Just as large-scale spatial movement maintains and sharpens galactic filaments and clusters, smaller-scale spatial movement also affects stellar orbits within galaxies. The attraction of space to mass may cause space within the galactic disk to rotate in the direction of galactic stellar orbits. This movement represents a competition between spatial stiffness and its connection with mass. Any rotation of space with the galaxies moves their galactic spatial reference them and reduces the disparity between observed galactic rotation speeds and lower rotational speeds for stable stellar orbits, that are consistent with observed galactic mass. The stBH within each galaxy give additional encouragement for the "local" spatial framework to follow galactic 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.

3. GALACTIC AND UNIVERSAL COLAPSE

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. 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 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 significantly exceeds 50% of rest mass) of all objects falling into them. Thus the gravitational attractions of newly formed UMBH exceed the combined attraction of their former SMBH and galaxies by numbers approaching 50% or more. This significant increase of gravitational attraction as galaxies become UMBH, should reverse universal expansion and begin its collapse. The above scenario is one answer to the question of how galactic and universal collapse might occur.

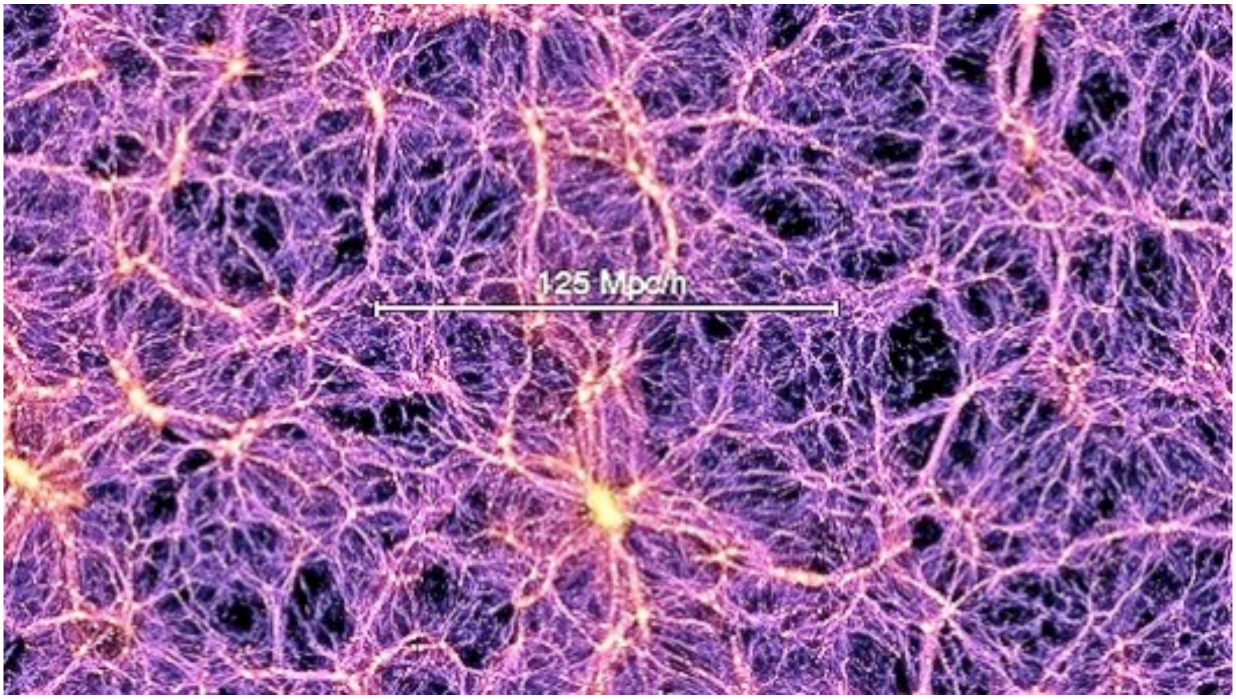

Figure 1. Galactic Filaments; Optical/UV: NASA/STScI; Radio: NSF/VLA/CfA/D.Evans et al., STFC/JBO