The Origin of Dense Star Clusters

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Abstract

The original accretion disks that dense star clusters supposedly came from would prevent them from having the angular momentum they now have. They would be too big originally and overlap each other and destroy their neighbour's rotation.

Introduction

Can dense star clusters form by chance? What about the problem of overlapping nebulas? The stars in these clusters and globular clusters are so big and so close to each other that the nebula's they formed from would have overlapped each other. Since stars rotate on their axis this forbids them forming from nebulas. The overlap would destroy each other's rotation. How wide would the accretion nebulae be for these stars? Would the two nebulas overlap each other? If this happened it would destroy the angular rotation of each star. We know that stars spin on their axis

Some of the very dense star clusters [1, 2] recently [Arches, Quintuple, R136a, NGC 3603] discovered have stars very close to each other.

R136a

R136, formally known as RMC 136, is a super star cluster near the center of the 30 Doradus complex (also known as the Tarantula Nebula), in the Large Magellanic Cloud. [3-9]

NGC 3603

NGC 3603 is an open cluster of stars situated in the Carina spiral arm of the Milky Way around 20,000 light-years away from the Solar System. It has the densest concentration of very massive stars known in the galaxy.[10-14].

The Arches Cluster

The Arches Cluster is the densest known star cluster in the Milky Way, and is located about 100 light years away from the centre of our galaxy, in the constellation Sagittarius.[15-17].

They are so close that the accretion nebulas they would have evolved from would have overlapped each other. This is not possible from an evolutionist viewpoint because the overlapping would destroy their rotation on their axis. Stars rotate on their axis [18, 19] and accretion to individual stars would be impossible if the accretion nebulas were overlapping each other.

Current theories [20] suggest that stars form from collapsing molecular clouds.

“The densest parts of the filaments and clumps are called "molecular cores", whilst the densest molecular cores are, unsurprisingly, called "dense molecular cores" and have densities in excess of 10^4–10^6 particles per cubic centimeter.” [21]

If we alter the density of the star to its original cloud density of one gram per cubic kilometre we see that the accretion nebula will overlap each other. This would be like two overlapping tornadoes or hurricanes. It would be impossible for them both to keep spinning with separate motions. Astronomer believe that these molecular clouds were between 0.01 parsecs to 0.1 parsecs (2,000 AU – 20,000 AU) wide [20]. If the both original nebula were this wide they would have overlapped and the cross shear would have destroyed each other's rotation.

The volume of a sphere is

$$V = \frac{4}{3}\pi R^3, \qquad \textbf{[1]}$$

Where V= volume and R= radius.
If the volume is known the radius can be calculated:

$$R = \sqrt[3]{\frac{V_n}{4\pi \div 3}}, \qquad \textbf{[2]}$$

The volume of the original accretion cloud is thus:

$$v = \frac{M}{p}, \qquad \textbf{[3]}$$

v = volume, cubic metres
M = objects current mass, kilograms
P = original nebulae density, one gram per cubic kilometre, [10^{-12} kilograms per cubic metre]

The radius of the original cloud is thus:

$$r = \sqrt[3]{\frac{M \div p}{4\pi \div 3}}, \qquad \textbf{[4]}$$

With dense star clusters, they would have had such large accretion clouds in their original form that it would be impossible for them to have formed their axial rotational motion. The clouds would overlap and destroy each other's rotation. If evolution were true their angular momentum must have an entirely different origin to that of the Sun. The close proximity of these prevents this from being a possibility. If they were rotating clouds in the beginning they would have overlapping radius and destroyed each other's rotation.

Solar Nebulae Volume

$$V_n = \frac{M}{p} \qquad \textbf{[5]}$$

This is the volume of the nebula an individual star accretes from.

M = Stars mass, kilograms
P = Nebula density, kilograms/cubic metre
V = Volume, cubic metres

Several star clusters recently discovered are too dense to have formed by accretion. The original accretion nebulae for individual stars would have overlapped each other. Some of the stars are losing mass so fast from solar wind that it is estimated that when they first formed the stars were twice their current mass.

The stars are so close together that they would have overlapped each other by between 393 to 1,547 AU. The density of the cluster is 200,000 Solar Masses per cubic parsec. Donald Figer [22] of the Space Telescope Science Institute, Baltimore has catalogued 200 giant stars in the cluster that range from 20 to 120 Solar Masses. The nebulas that evolutionists suppose that they accreted from would have all overlapped each other in such a confined space.

Star Clusters Volume, Cubic metres

$$V_c = \frac{4\pi}{3} R_c^{\ 3}, \qquad \textbf{[6]}$$

v = Volume, Cubic metres
R_c = Clusters radius, metres

Solar Separation Radius
This is the average distance between the centre of each star in metres.

$$R_s = \sqrt[3]{\frac{V_s}{4\pi \div 3}}, \qquad \textbf{[7]}$$

R_s = Metres [average] between the centre of stars in the cluster.

Solar Space Volume
This is the non overlapping spheres of empty space around each star. The largest imaginary sphere around each star without touching another star.

$$V_s = \frac{4\pi R_c^{\ 3}}{3n}, \qquad \textbf{[8]}$$

V_s = Empty space around a star, cubic metres
C_r = Clusters radius, metres
n = Number of stars in cluster

Dense star cluster solar nebulae space overlap ratio

$$\Omega = \left[\sqrt[3]{\frac{V_n}{4\pi \div 3}}\right] \div \left[\sqrt[3]{\frac{V_s}{4\pi \div 3}}\right], \qquad \textbf{[9]}$$

Stars cannot form if Ω > 1 or = 1

Solar Nebulas Radius, Overlap Metres

$$\Psi = \sqrt[3]{\frac{V_n}{4\pi \div 3}} - \sqrt[3]{\frac{V_s}{4\pi \div 3}} \qquad \textbf{[10]}$$

If the distance between the centre of stars is 1,000 AU, then the maximum width of the accretion nebula of each one must be less than 500 AU or else they would destroy each other's rotation. Many of these giant stars in these clusters have very strong solar winds. This means that they are losing so much material that when they first formed they would have been much larger than what they are today.

4.1. Paradox of Youth

"The results presented here confirm and substantially deepen the mystery surrounding the existence of the massive young stars in the inner few hundredths of a parsec around the central black hole of the Galaxy. In short, the problem is that according to standard scenarios of star formation and stellar dynamics the stars cannot be born in such an extreme environment because of the strong tidal shear, but are also too short-lived to have migrated there from farther out. None of the solutions proposed so far for the puzzle of the young stars (e.g., Morris 1993; Genzel et al. 2003b; Ghez et al. 2003, 2005 and references therein) are entirely satisfactory." [23]

“Well-determined orbital parameters for these seven Sgr A* cluster stars also provide new constraints on how these apparently massive, young (<10 Myr) stars formed in a region that seems to be hostile to star formation. Unlike the more distant He i emission line stars—another population of young stars in the Galactic center—that appear to have coplanar orbits, the Sgr A* cluster stars have orbital properties (eccentricities, angular momentum vectors, and apoapse directions) that are consistent with an isotropic distribution. Therefore, many of the mechanisms proposed for the formation of the He i stars, such as formation from a pre existing disk, are unlikely solutions for the Sgr A* cluster stars. Unfortunately, alternative theories for producing young stars, or old stars that look young, in close proximity to a central super massive black hole are all also somewhat problematic. Understanding the apparent youth of stars in the Sgr A* cluster, as well as the more distant He i emission line stars, has now become one of the major outstanding issues in the study of the Galactic center.” [24]

“While the presence of young stars in close proximity to our Galaxy’s super massive black hole has long been recognized as a problem in the context of the young He i emission line stars (Sanders 1992; Morris 1993), this problem is much worse for the Sgr A* cluster stars, whose distances from the black hole are an order of magnitude smaller.” [25]

“In the context of the luminous He i emission line stars, which are located an order of magnitude farther from the black hole than the Sgr A* cluster stars, several ideas have been proposed to account for apparently young stars in a region whose current conditions seem to be inhospitable to star formation: (1) that these are old stars masquerading as youths, (2) that they were formed more or less in situ by a cataclysmic compression of an already dense cloud or disk, and (3) that they were formed elsewhere as part of a massive cluster but migrated inward rapidly by dynamical friction. Here we briefly examine each of these hypotheses in the context of the Sgr A* cluster stars.” [26]

Because of the impossibility of a naturalistic explanation for their origin, the author offers three different scenarios to explain this problem. All of the three theories are discussed at the end of the article and the author frankly admits they are all full of major problems. [27]

Such a cluster is very difficult to explain with an evolutionist basis.

“It is challenging to explain the presence of such a young star in close proximity to a super massive black hole. Assuming that the black hole has not significantly affected S0-2’s appearance or evolution, S0-2 must be younger than 10 Myr and thus formed relatively recently. If it has not experienced significant orbital evolution, its apoapse distance of 1900 AU implies that star formation is possible in spite of the tremendous tidal forces presented by the black hole, which is highly unlikely. If the star formed at larger distances from the black hole and migrated inward, then the migration would have to be through a very efficient process. Current understanding of the distribution of stars, however, does not permit such efficient migration.” [28]

“More exotically, it could be a “reborn” star, which occurs as the product of a merger of a stellar remnant with a normal star. None of these possibilities is altogether satisfactory, leaving S0-2 as a paradox of apparent youth in the vicinity of a super massive black hole.” [28]

Table 1. The Arches Star Cluster. The accretion nebulas of individual massive stars [22] would overlap and destroy each other.

Stars	Nebulae	Maximum Allowed	Overlap	Overlap
Name	Radius, AU	Radius, AU	AU	Million Km's
N4	2,572	512	2,060	308,176
N1	2,572	512	2,060	308,176
N14	2,572	512	2,060	308,176
N11	2,572	512	2,060	308,176
N9	2,572	512	2,060	308,176
N8	2,572	512	2,060	308,176
N10	2,572	512	2,060	308,176
N7	2,572	512	2,060	308,176
N5	2,572	512	2,060	308,176
B30	2,572	512	2,060	308,176
N6	2,572	512	2,060	308,176
B31	2,550	512	2,038	304,885
B12	2,470	512	1,958	292,917
N12	2,418	512	1,906	285,138
B19	2,416	512	1,904	284,838
B29	2,401	512	1,889	282,594
AR9	2,354	512	1,842	275,563
AR6	2,354	512	1,842	275,563
B7	2,318	512	1,806	270,178
B27	2,317	512	1,805	270,028
B2	2,152	512	1,640	245,344
B18	2,095	512	1,583	236,817
B16	2,075	512	1,563	233,825
B14	2,060	512	1,548	231,581
B9	2,053	512	1,541	230,534
B15	2,014	512	1,502	224,699
B13	2,007	512	1,495	223,652
B5	2,002	512	1,490	222,904

Table 2. Star cluster NGC 3603 [30]

Stars Name	Nebula Radius AU	Maximum Allowed Radius, AU	Overlap AU	Overlap Million Km's
NGC 3603 - A	1,483	840	643	96,173
NGC 3603 - B	1,525	840	685	102,425
NGC 3603 - C	1,564	840	724	108,352
NGC 3603 - D	1,583	840	743	111,206
NGC 3603 - E	1,602	840	762	113,993
NGC 3603 - F	1,620	840	780	116,716
NGC 3603 - G	1,655	840	815	121,987
NGC 3603 - H	1,672	840	832	124,540
NGC 3603 - I	1,689	840	849	127,043
NGC 3603 - J	1,706	840	866	129,496
NGC 3603 - K	1,722	840	882	131,904
NGC 3603 - L	1,738	840	898	134,267
NGC 3603 - M	1,753	840	913	136,588
NGC 3603 - N	1,768	840	928	138,868
NGC 3603 - O	1,921	840	1,081	161,710
NGC 3603 - P	1,959	840	1,119	167,346
NGC 3603 - Q	2,041	840	1,201	179,716
NGC 3603 - R	2,053	840	1,213	181,403
NGC 3603 - S	2,097	840	1,257	187,974
NGC 3603 - T	2,139	840	1,299	194,280
NGC 3603 - U	2,189	840	1,349	201,828
NGC 3603 - V	2,237	840	1,397	209,044
NGC 3603 - W	2,256	840	1,416	211,845
NGC 3603 - X	2,274	840	1,434	214,600
NGC 3603 - Y	2,293	840	1,453	217,312
NGC 3603 - Z	2,337	840	1,497	223,909
NGC 3603 - 1	2,362	840	1,522	227,751
NGC 3603 - 2	2,396	840	1,556	232,747
NGC 3603 - 3	2,444	840	1,604	239,989
NGC 3603 - 4	2,498	840	1,658	248,092
NGC 3603 - 5	2,536	840	1,696	253,671
NGC 3603 - 6	2,572	840	1,732	259,091

Table 3. Star cluster R136a [29]

Stars Name	Cloud Radius, AU	Maximum Radius, AU	Overlap AU	Overlap Million Km's
R 136a - A1	3,349	1508	1,841	275,443
R 136a - A2	3,024	1508	1,516	226,747
R 136a - A3	2,675	1508	1,167	174,564
R 136a - C	2,917	1508	1,409	210,721
R 136a - 1	2,209	1508	701	104,820
R 136a - 2	2,030	1508	522	78,077
R 136a - 3	2,018	1508	510	76,352
R 136a - 4	2,007	1508	499	74,606
R 136a - 5	1,908	1508	400	59,848
R 136a - 6	1,783	1508	275	41,177
R 136a - 7	1,841	1508	333	49,789
R 136a - 8	1,783	1508	275	41,177
R 136a - 9	1,959	1508	451	67,413
R 136a - 10	1,934	1508	426	63,680
R 136a - 11	1,738	1508	230	34,334
R 136a - 12	1,798	1508	290	43,382

Globular Clusters

The same problem would occur with the centre of globular clusters. The stars individual accretion nebulas would overlap like two colliding tornadoes and destroy each other's rotation.

"The average star density in a Globular Cluster is about 0.4 stars per cubic parsec. In the dense center of the cluster, the star density can increase from 100 to 1,000 per cubic parsec." [31]

"This figure shows a schematic representation of the stars in the center of the dense globular cluster M30. The stellar density is approximately one million solar masses per cubic parsec in the central regions." [32]

Very massive globular clusters like Andromeda G1 and Omega Centauri [33, 34] also pose the same problem.

Conclusion

The dense star clusters in the Milky Way [Arches, Quintuplet, NGC 3603] and the Large Magellanic Cloud [R136a] have a large number of giant stars in them. The amount of solar wind that they emit indicates that some of the stars could have been up to 300 Solar Masses when they formed. These stars are too close together for such large accretion nebula to have made them. Evolutionists admit major problems in a naturalistic explanation for their origin. The creationist view of instant recent creation fits the evidence much better. To me all the evidence points to our galaxy being created on day four of the creation week.

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