# QGD Explanation of Abell 3827 Dark Matter Offset

by

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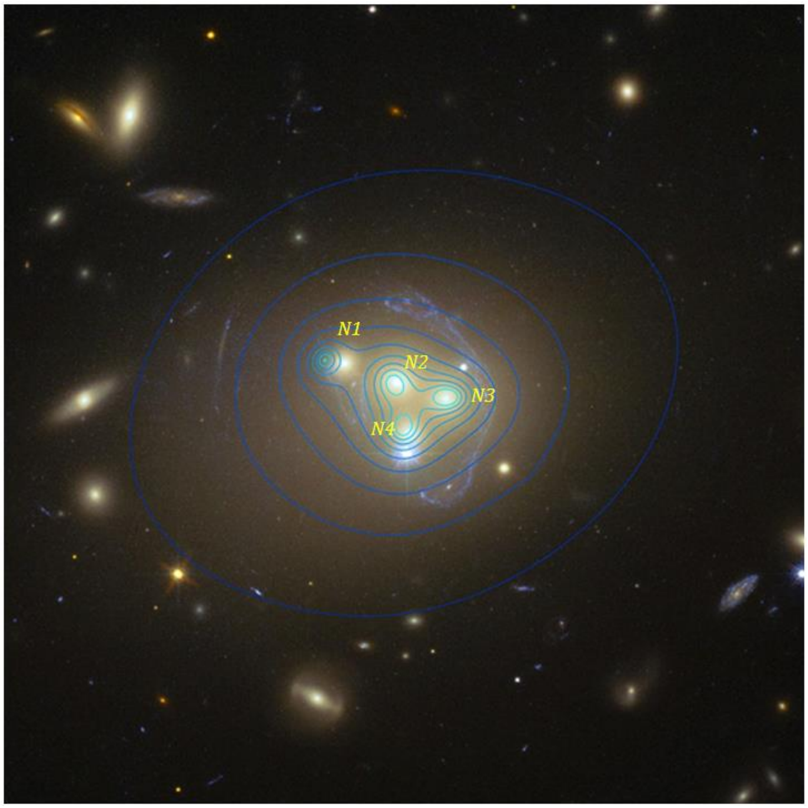


**Image 1 by ESA/Hubble**

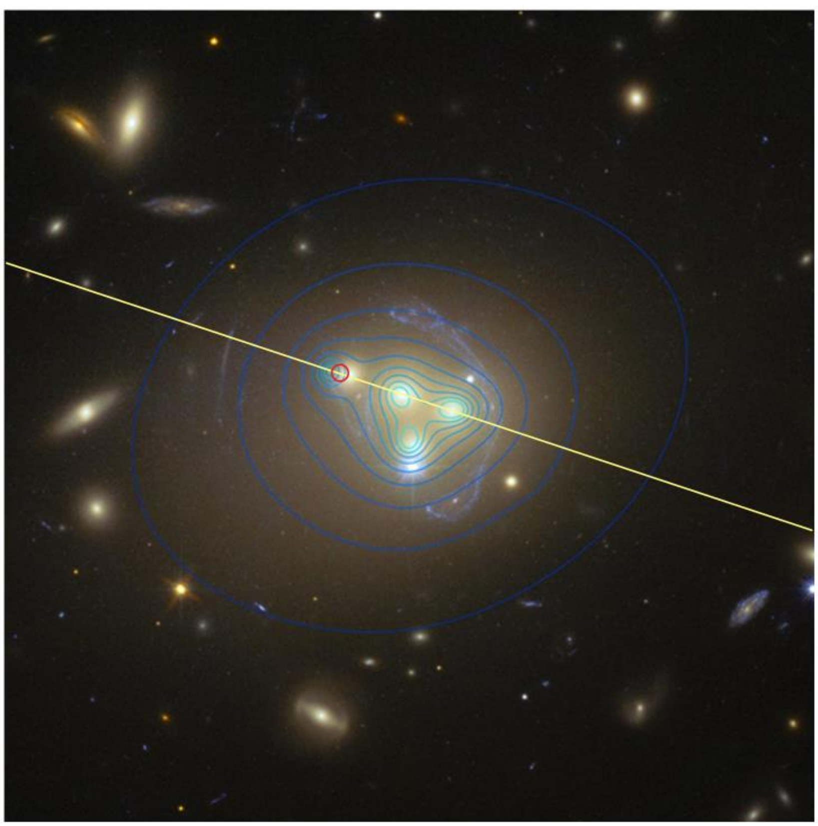

**Image 2 by ESA/Hubble**

Note that this article assumes that the reader is familiar with quantum-geometry dynamics; minimally with the concepts introduced in An Axiomatic Approach to Physics.

Recent observations of a group of four galaxies in the galaxy cluster Abell 3827 showed an offset in the position of the dark matter halo of a galaxy (see N1 galaxy in photograph 1)[i]. It is speculated that the offset is caused by interaction other than gravitational between dark matter within the group. QGD predicts the observed offset is caused by a massive structure at a distance of several mega parsecs from the group.

According the quantum-geometry dynamics, gravitational interactions are described by the equation $G(a;b)=m_a m_b\left(k-\frac{d^2+d}{2}\right)$ where $m_a$ and $m_b$ are the masses of two massive regions or structures and $d$ the distance that separates them all (with masses and distances expressed in fundamental units). The equation implies a threshold distance $d_\Lambda$ such that $\frac{d_\Lambda^2+d_\Lambda}{2}=k$ at which regardless of $m_a$ and $m_b$ the magnitude of the gravitational interaction is always equal to zero. And for $d>d_\Lambda$, since $\frac{d^2+d}{2}>k$, gravity becomes negative, hence repulsive. From observations[ii], we can estimate that $d_\Lambda \approx 10Mpc$

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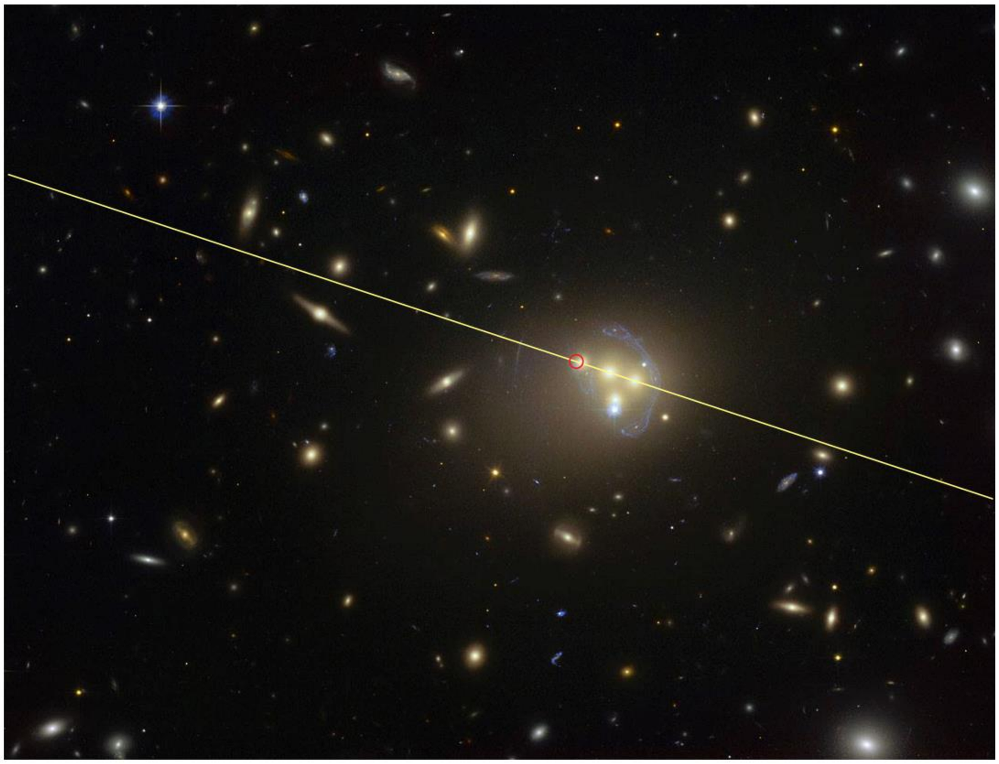

Image 3 by ESA/Hubble

So if QGD's description of gravity is correct, then the observed offset could be caused by a gravitational interaction with a supermassive structure at exactly the gravitational threshold distance from the region, outlined by the red circle in image 2, between the N1 and the offset dark matter. If the distance to the supermassive structure would greater or smaller by only a few parsec, then the entire N1-N4 would be affected as a whole and there would be no observable offset. Also, the supermassive structure causing the offset would have to be exactly on the axis that goes through the centers of N1 and the center its associated dark matter halo.

If the supermassive object is on the left, the speed at which the lag will increase at the speed given by

$$\Delta v_l = -m_s\left(k - \frac{d_1^2 + d_1}{2}\right) + m_s\left(k - \frac{d_2^2 + d_2}{2}\right) = m_s\left(\frac{d_1^2 + d_1}{2} - \frac{d_2^2 + d_2}{2}\right).$$

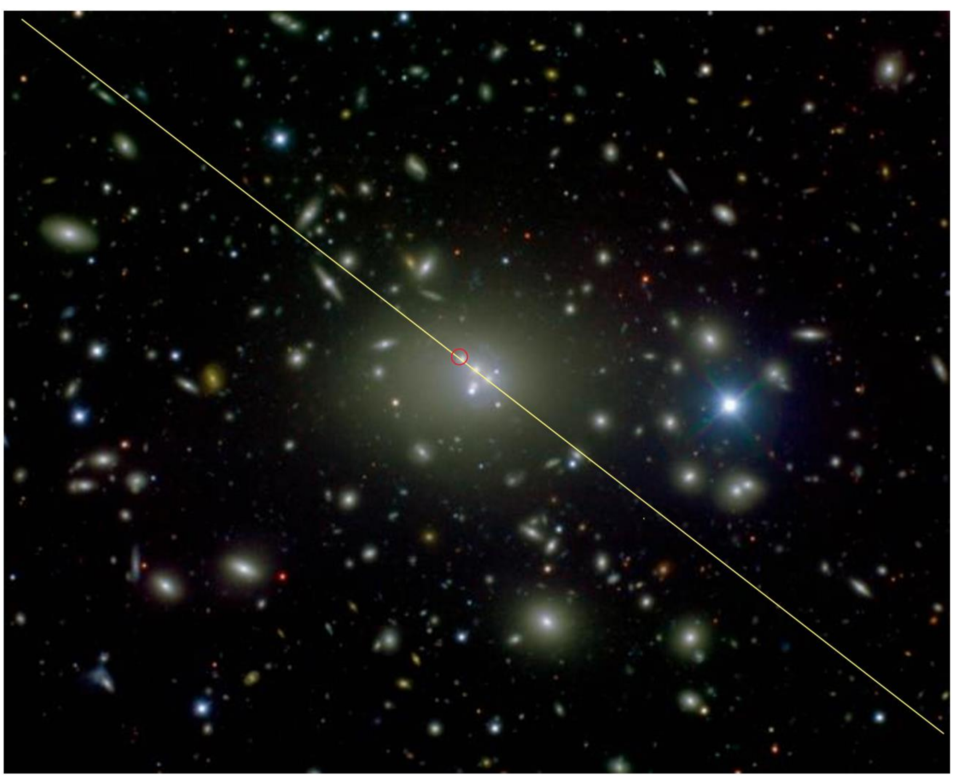

Image 4 by Gemini Observatory/AURA

The magnitude of the offset suggests that no significant massive structure exist directly on the axis between the outlined region and the supermassive structure causing the offset. This is consistent with the images 2, 3 and 4, which shows no structure lying on the axis in the region of space they cover.

If the predicted supermassive structure exists, its distance from the cluster would help refine the estimate of the constant $k$.

Only astronomers can falsify the prediction that such a superstructure exist. Hopefully, this short paper will provide the necessary motivation to prompt one or more to search for the supermassive structure predicted by QGD.

**A Note About Repulsive Gravity**

From QGD's equation for gravity, we can see that beyond the threshold distance repulsive gravity between two structures increases approximately proportionally to the square of the distance between them. The relative acceleration between the two structures is then given by

$$\Delta v_{s_1} + \Delta v_{s_2} = \frac{m_{s_1} m_{s_2}}{m_{s_1}}\left(k - \frac{d^2 + d}{2}\right) + \frac{m_{s_1} m_{s_2}}{m_{s_2}}\left(k - \frac{d^2 + d}{2}\right)$$

$$= \left(m_{s_2} + m_{s_1}\right)\left(k - \frac{d^2 + d}{2}\right)$$ , which observations should confirm.

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[i] The behaviour of dark matter associated with four bright cluster galaxies in the 10 kpc core of Abell 3827, Richard Massey and Al. http://mnras.oxfordjournals.org/content/449/4/3393

[ii] Dark energy and key physical parameters of clusters of galaxies http://arxiv.org/abs/1206.1433