

2016 Go-STEM Summer Institute

How It Works:
Space & Astronomy





















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...the galaxy clusters as a function of
...the number N . The mean number of galaxies in the clusters
...lengths between members in the clusters. Clusters of size N are
...are supported by the core of the mass-concentration factor of
...clusters.

Observations of the Coma Cluster Background Indicate that the early Universe
...was relatively homogeneous with density contrasts in the order of

$$\delta \approx \rho/\bar{\rho} \approx 10^{-5}$$

where ρ is the local density and $\bar{\rho}$ is the average density of the causally connected
...Universe. Prior to the epoch of matter-radiation energy density equivalence ($t \approx 4700$
...density perturbations were Gaussian distributed for size scales smaller than the
...causal horizon scale that was set by the age of the Universe and the speed of light.
...These scales can be related by the current scale parameter of $a = 1$, where the scale
...parameter was $a_0 = 10^{-11}$ at time t_0 . The scale parameter indicates the relative
...size of a clustering portion of the Universe as a result of the expansion of space-
...time.

After t_0 , locally overdense regions on sub-horizon scales could increase in density
...controlled by gravitational collapse. The rate of growth of these sub-horizon density
...perturbations was dependent on wave number $k = 1/\lambda$. The slowest form of the
...equation for the growth of these perturbations is

$$\ddot{\delta} + 2H\dot{\delta} = -\frac{4\pi G}{3}\bar{\rho}\delta$$

where dotted values represents time-derivatives, H is the total Hubble speed, G is the
...Universal Constant of Gravitation, and ρ is the local mean density. The quantity
... λ is proportional to the Hubble Parameter, a measure of the rate of expansion of
...the Universe as a function of time.

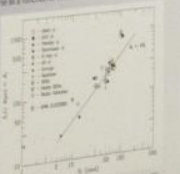


Figure 1




Figure 2

The Trainwreck Cluster




Figure 3

Determining the Statistical Properties of Cluster Co
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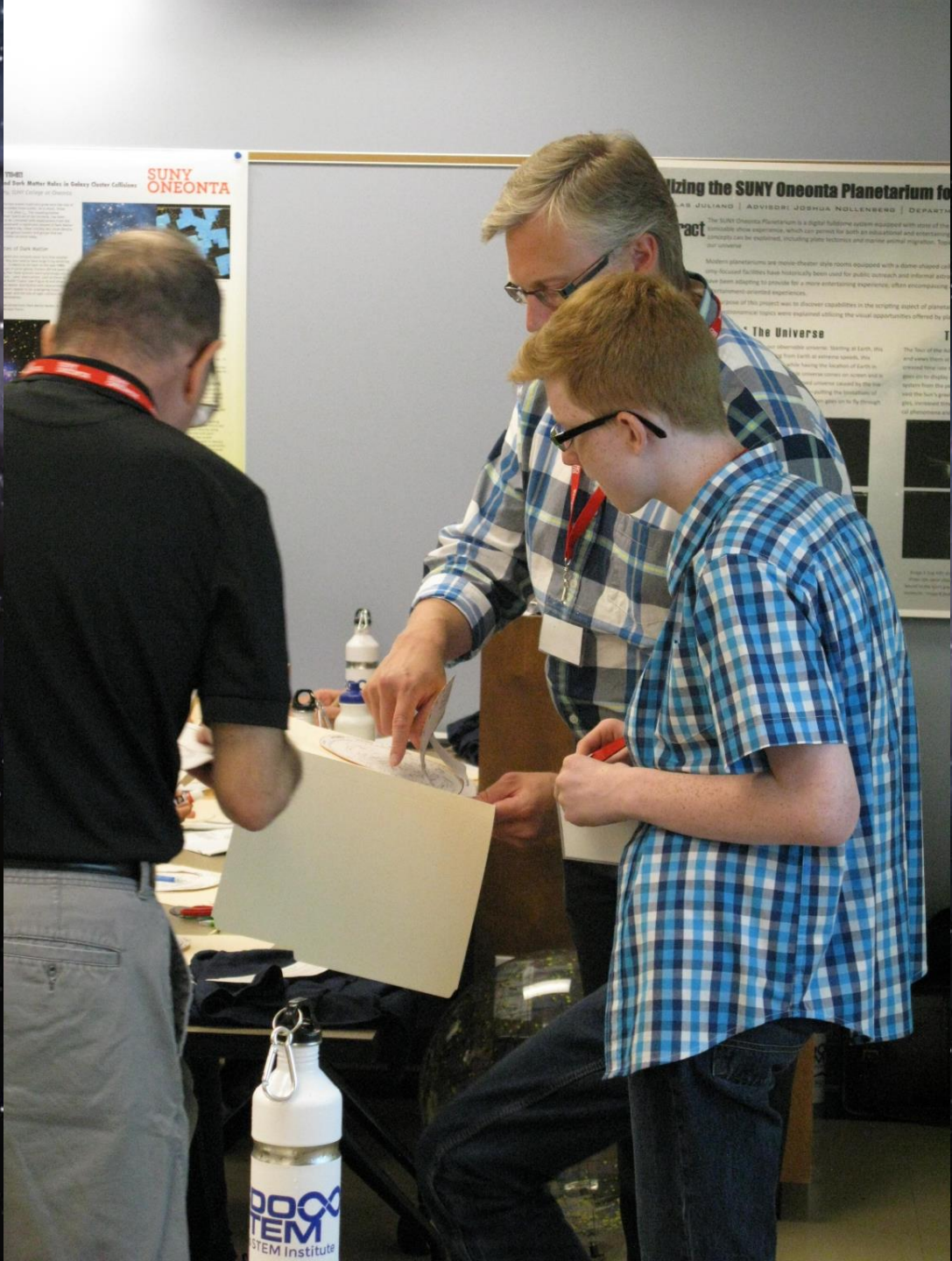
Bibliography

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AKA "The Bullet Cluster" shows a separation between dark matter and gas. This is apparent due to the fact that the X-ray gas is lagging behind the dark matter. As a result, the clouds of X-ray gas are separated from the dark matter particles in the clusters, which only comprise a small fraction of the remaining 80% of the mass. 4/5 is locked up in the X-ray gas.



Another example of X-ray gas left behind after a cluster collision. Unlike the case of the Bullet Cluster, the gas is separated as well as the X-ray gas. The gas is also fainter star-light associated with the galaxies in combination of hotter X-ray gas and Dark Matter is approximately 145 degrees relative to the left.

... are clues regarding the specific conditions surrounding galaxy cluster collisions. It should be possible to determine typical collision scales and rates by using Newtonian general relativistic dynamics. However, given the mass scales of the cluster collisions which have been observed so far, it will be important to model the growth in density perturbations using nonlinear models, and there is still a good deal of observational uncertainty regarding the amount of nonlinearity there has been in gravitational clustering in the Universe to this point, and also in the size scales where it is relevant. This may yield new clues for signatures that will facilitate detecting cluster collisions on much smaller mass scales.

One potential complication is in the X-ray derived cluster masses, which will be necessary in order to determine local X-ray gas densities and net momentum transfer. These masses are generally computed under the assumption of a virialized gas distribution, and this certainly counts for the scatter within the X-ray-derived mass. Temperature relation shown in Figure 3. Mass estimates based on Gravitational Lensing will be important here, though this samples all of the mass, and the collisional (X-ray) component only comprises a small fraction of this mass. As a result, a multi-parameter Bayesian model will have to be developed which is capable of factoring in bias in gravitational collapse.

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n a big
telescope

Full dome digital projection and sound system along with theater
seating, carpeting, and wall treatments plus installation of an
adjacent display gallery and classroom. The original dome theater
space had been refurbished to originally complement the new projection
A 2018 software upgrade to the new Digital IM system maintains the
facility's cutting-edge capabilities. The dual server-mounted computer
controlled projector's place over five million pixels on the dome
providing stunning, immersive astronomical experiences ranging from
Earth-based views of the sky as seen from any terrestrial location
at any epoch in time to virtual voyages through our Solar System,
the Milky Way Galaxy, and our Universe. In addition to its
astronomical uses, the facility also acts as the ultimate digital theater
providing compelling immersive experiences for students and
audiences from a wide range of academic fields across campus.



































Ron Garan
27/40



→ Computer Eng. → Programme

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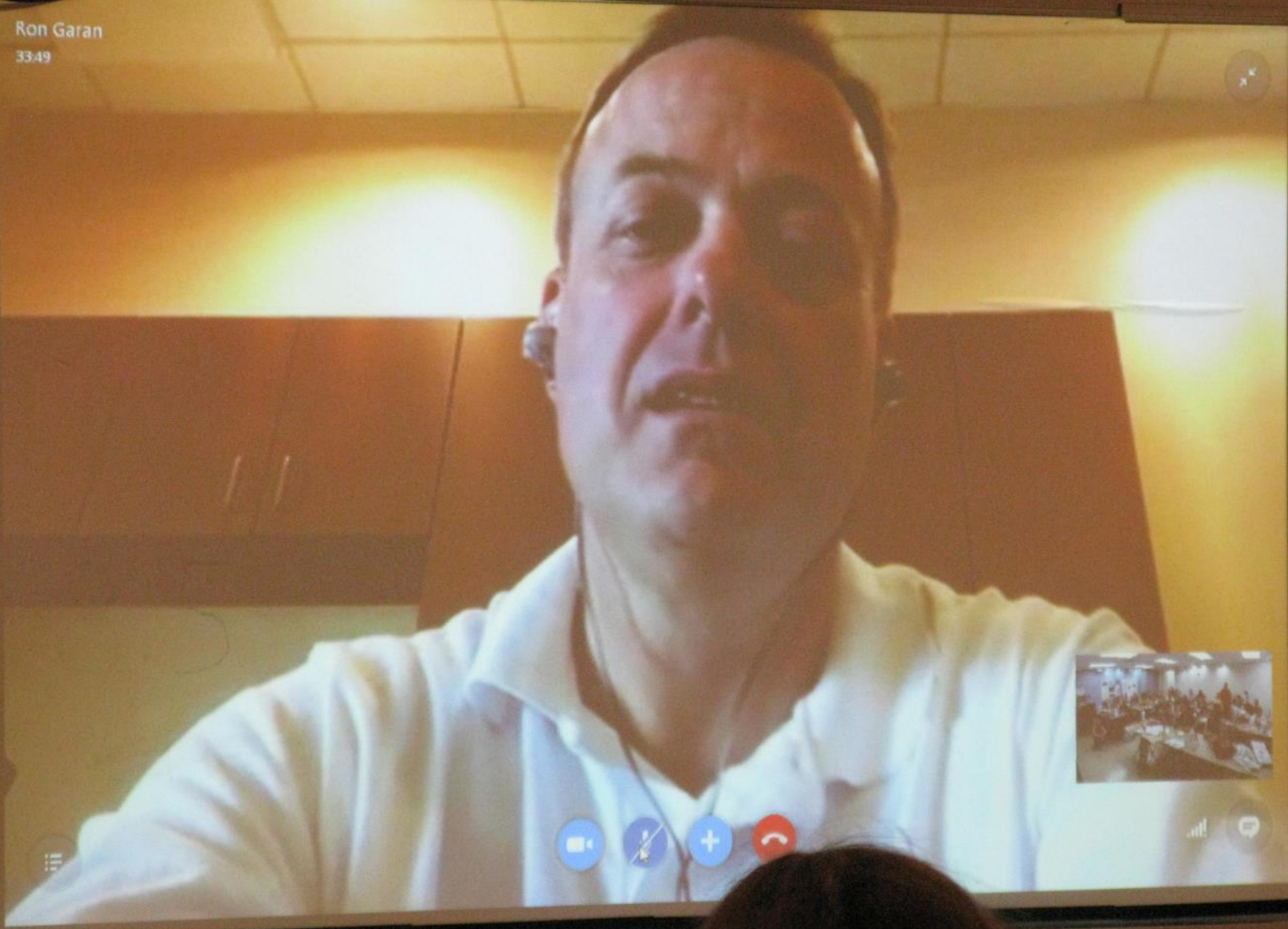
3 Period² = $k \times \text{something}$

$$P^2 = k a^3$$

Semi-major axis



Ron Garan
33:49





Physics - Mechanical Eng.
Electrical Eng. → Computer Eng. → Programing
Chemistry - Chemical Engineers
Biology -
Earth Science

$3 \text{ Rad}^2 = \text{transmission}^2$
 $p^2 = k^2$





































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