



Observing Dark Worlds

Can you find the Dark Matter that dominates our Universe? Winton Capital offers you the chance to unlock the secrets of dark worlds.

\$20,000 · 353 teams · 5 years ago

Overview

Description

There is more to the Universe than meets the eye. Out in the cosmos exists

Overview

Data

Discussion

Leaderboard

Rules

Prizes

absorb light, so we call it **Dark Matter**.

About The Sponsor

Such a vast amount of aggregated matter does not go unnoticed. In fact we observe that this stuff aggregates and forms massive structures called **Dark Matter Halos**.

An Introduction To Ellipticity

Getting Started With Code

Submission Instructions

Although dark, it warps and bends spacetime such that any light from a background galaxy which passes close to the **Dark Matter** will have its path altered and changed. This bending causes the galaxy to appear as an ellipse in the sky.

Winners

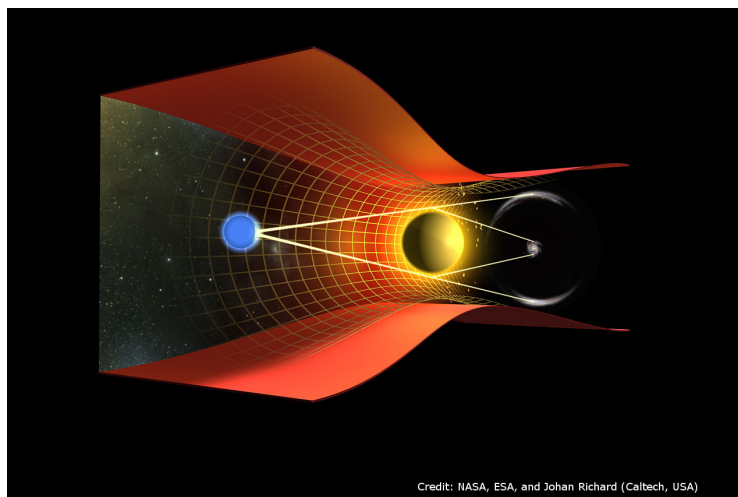
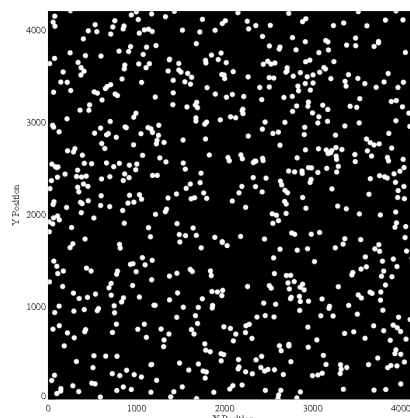


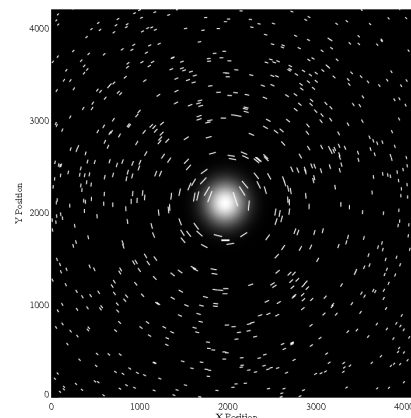
Figure 1: Dark Matter bending the light from a background galaxy. In extreme cases the galaxy here is seen as the two arcs surrounding it. (Credit: NASA,

ESA, and Johan Richard (Caltech, USA))

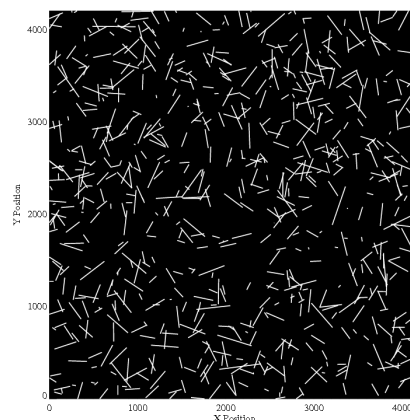
Since there are many galaxies behind a *Dark Matter* halo, their shapes will correlate with its position.



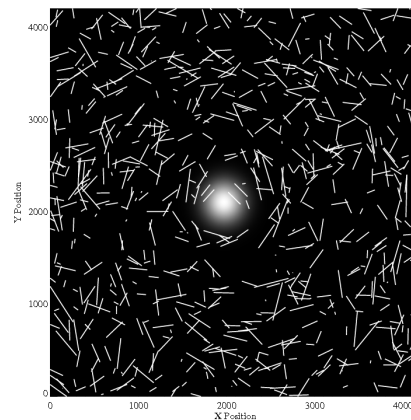
A. Distant circular galaxies (or dots in this case) are randomly distributed in the sky. Each galaxy has an (x,y) coordinate corresponding to the position in the sky from 0:4200



B. By placing a *Dark Matter* halo in the middle of the sky between us and the background galaxies, they are altered such that they become elliptical. The lines show the orientation and size of the major axis of the galaxy.



C. However unfortunately galaxies are NOT circular and in fact they are inherently elliptical. This property is random, however since the Universe has no preferred ellipticity this averages out to zero in the case of no other influence.



D. Therefore if we placed a *Dark Matter* halo into a field of randomly elliptical galaxies we would get a field that does not average out to zero. If we can use the fact that *Dark Matter* makes the pattern seen in B, we should be able to detect the position of the central halo.

Figure 2: The effect of *Dark Matter* on the sky

What's The Problem?

Detecting these *Dark Matter* halos is hard, but possible using this data. If we can accurately estimate the positions of these halos, we can then understand the function they play in the Universe. There are various methods to attack the problem (we have given you some examples), however we have not been able to reach the level of precision required to understand exactly where this *Dark Matter* is for all *Dark Matter* halos.

We challenge YOU to detect the most elusive, mysterious and yet most abundant matter in all existence.

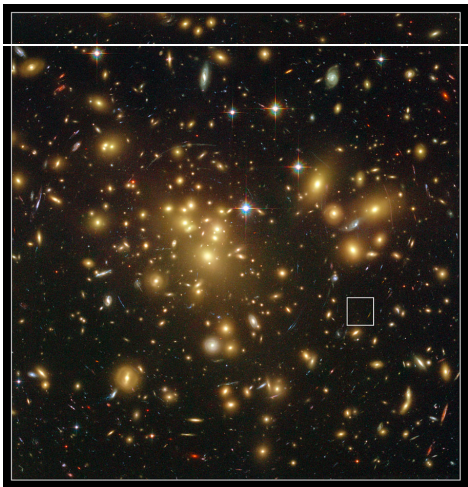


Figure 3: Dark Matter in Action. If you look closely at this real world example, you can see the warped and elliptical galaxies. (Credit NASA; ESA; L. Bradley (Johns Hopkins University); R. Bouwens (University of California, Santa Cruz); H. Ford (Johns Hopkins University); and G. Illingworth (University of California, Santa Cruz))

Challenge Organisers: David Harvey (Astrophysics PhD Student, Institute for Astronomy, University of Edinburgh), Dr. Tom Kitching (Royal Society Post Doctorial Fellow, Institute for Astronomy, University of Edinburgh)

Leaderboard



- 1 Tim Salimans
- 2 Iain
- 3 AMPires
- 4 Supernova
- 5 Quadrivio
- 6 Anil Thomas
- 7 Olexandr Topchylo
- 8 jostheim

107 discussion topics



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- [Script for installing lenstool](#)
5 replies · 4 years ago
- [Time.com: Dark Matter May Not Exist At All](#)
0 replies · 5 years ago
- [Lenstool](#)
121 replies · 5 years ago
- [Demographics of Participants, comments and q...](#)
1 reply · 5 years ago

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5 years ago

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5 years ago

353

Teams

424

Competitors

Points

This competition awarded standard [ranking points](#)

Tiers

This competition counted towards [tiers](#)

Tags

custom metric

extra small