Strong Lensing Challenge

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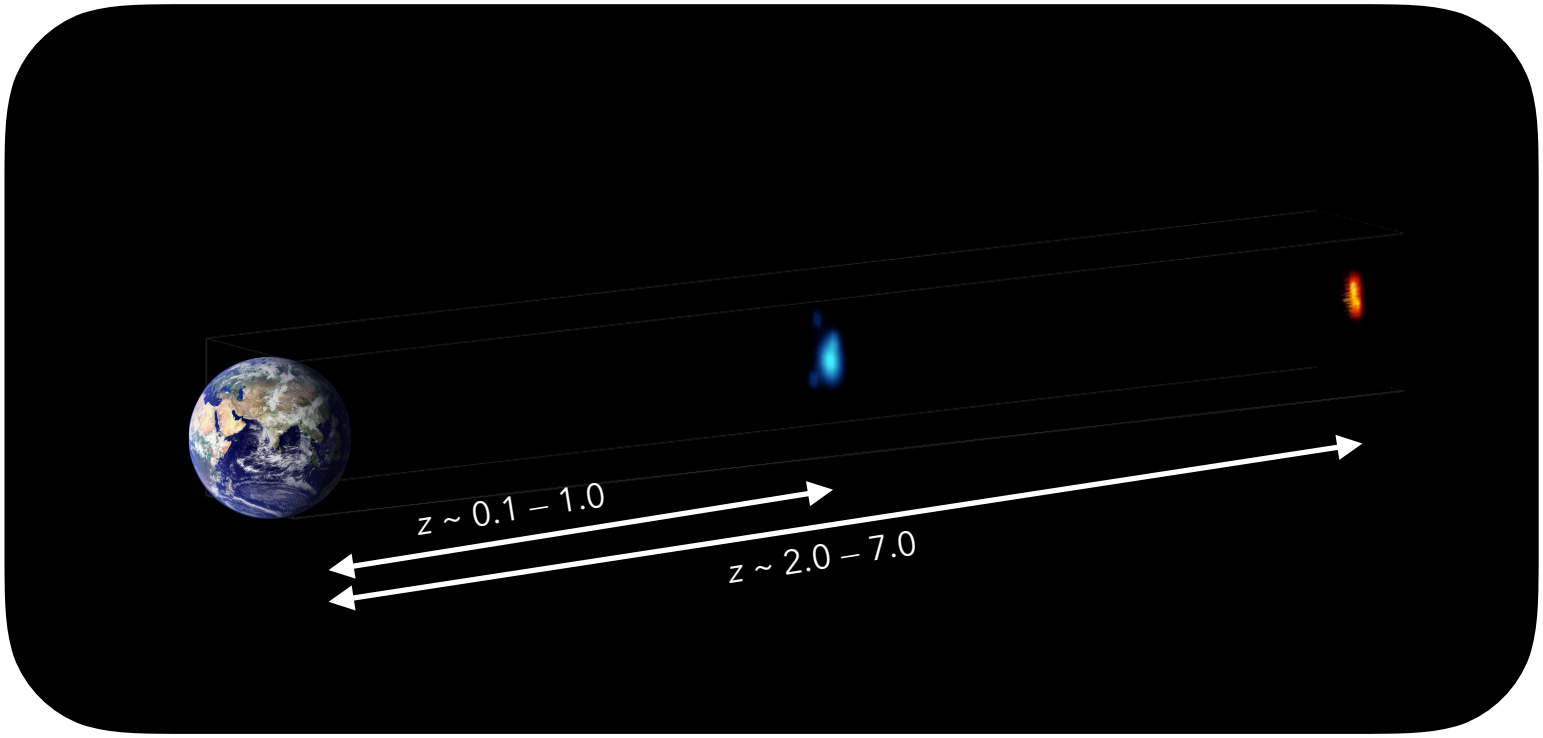
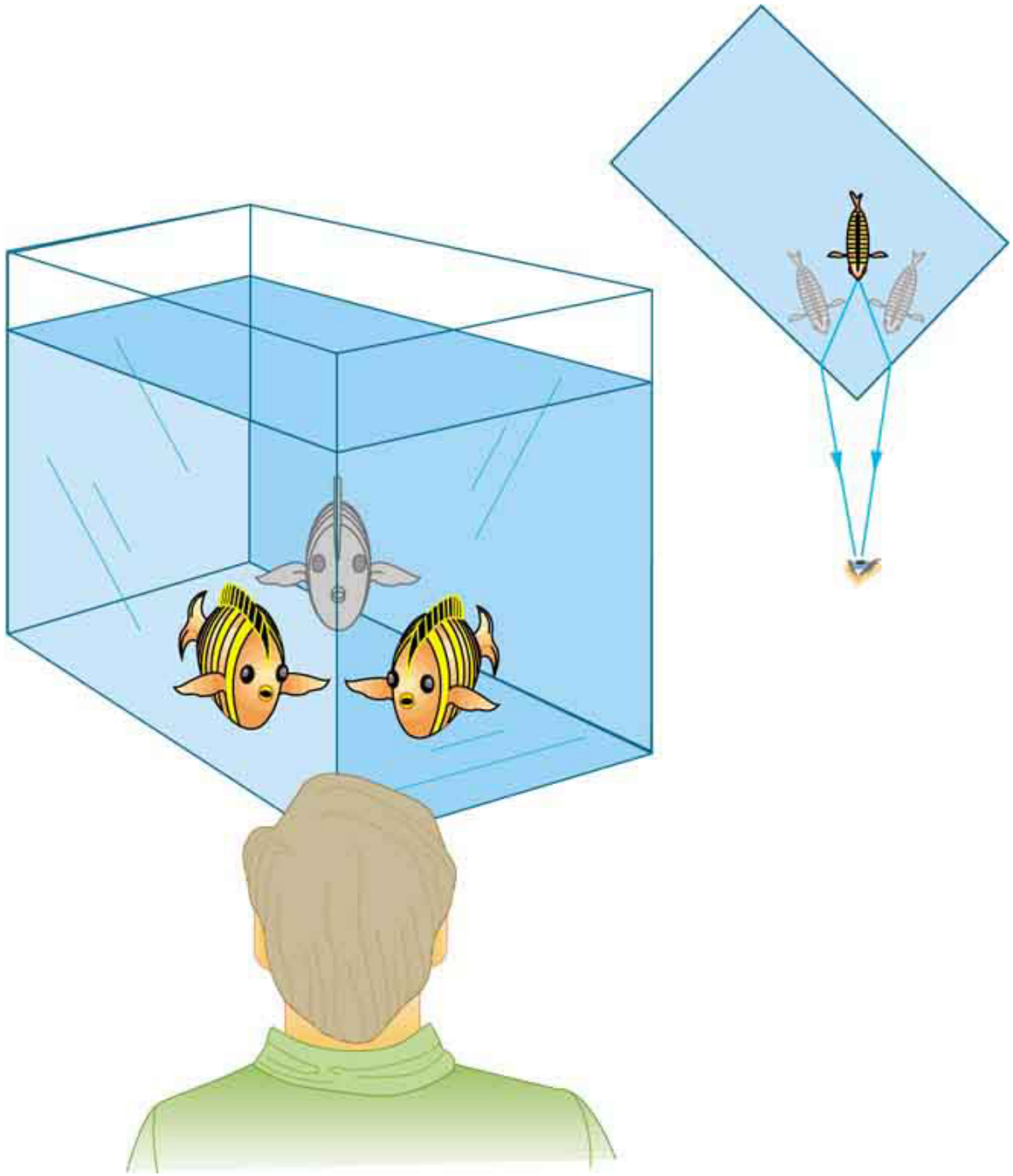
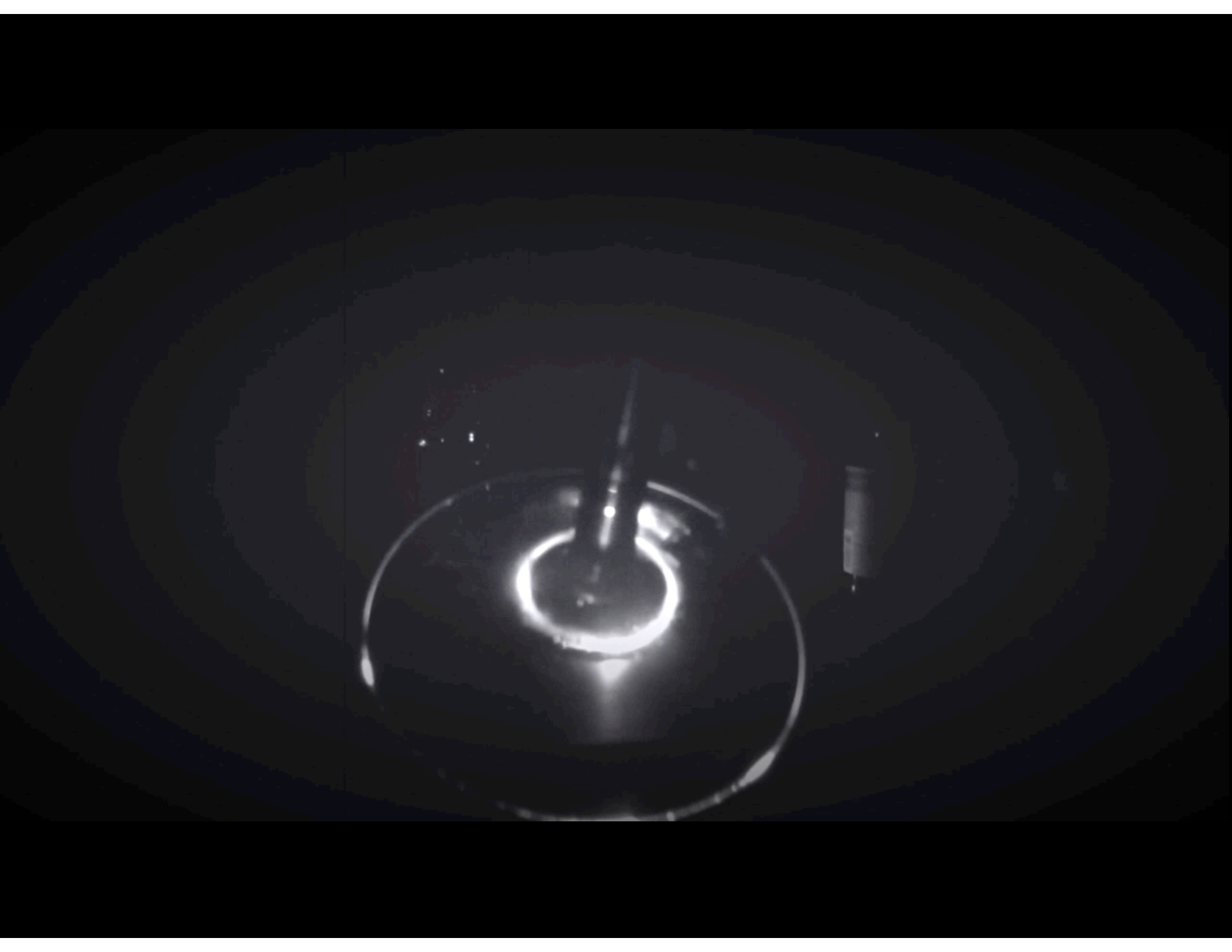
Strong Gravitational Lensing

Formation of **multiple images** of a single distant object due to the **deflection of its light** by the **gravity** of intervening structures.

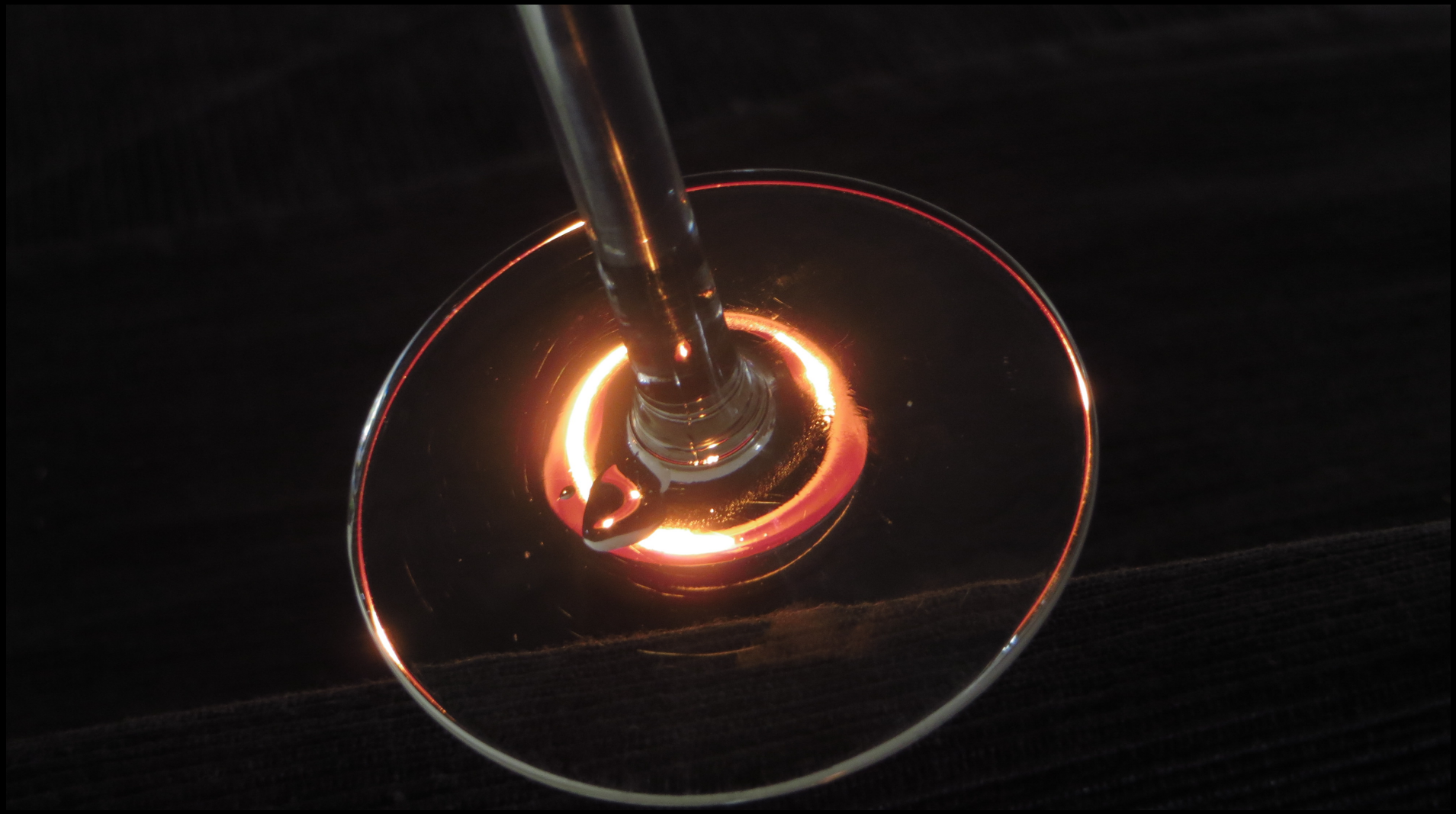






Cold Dark Matter

Warm Dark Matter



Challenge Goal

Dark Matter Substructure

Using strong lensing to map the dark matter distribution on small scales, by measuring the abundance of dark matter subhalos

Stages

0 - Macro modeling

Finding the overall matter distribution in the lensing galaxies (when no subhalos are present).

1- One subhalo of fixed mass

Find the location of a subhalo of fixed mass in strong lenses.

2- Measure the abundance of subhalos

A number of subhalos of a given fixed mass are present in the lens. The task is to measure the number density of subhalos (how many subhalos per unit area of the sky).

3- measure the mass function

Expand stage 2 to include subhalos of different masses.

Data

Data for the challenge will be simulated by the evil team, and will be made available to download at every stage to the participants. The code for producing the training data will also be provided (teams are welcome to produce more training data if needed).

So far the evil team consists of me and Warren Morningstar

Start Date

We are looking to have a start date of the challenge towards the end of July, with stage 0 lasting about 2 months.

How to participate?

Contact Laurence Perreault Levasseur through slack or by email: lplevass@stanford.edu with the members of your team, **before July 27th**

The primary mode of communication will be through the slack channel.

Thank you