The 2024 Köln AG GAVO Puzzler

German Astrophysical Virtual Observatory

Can You See Through A Galaxy Cluster?

Galaxies are extended objects. And they come quite densely when they group in larger clusters. So: How much of what is behind them is obscured by the galaxies in a cluster?

Let's look at the Virgo cluster: which proportion of the 1-degree circle around M87 is obscured by galaxies, where we define "obscure" as "covered by a circle of four J-magnitude half-light radii around an extended object"?
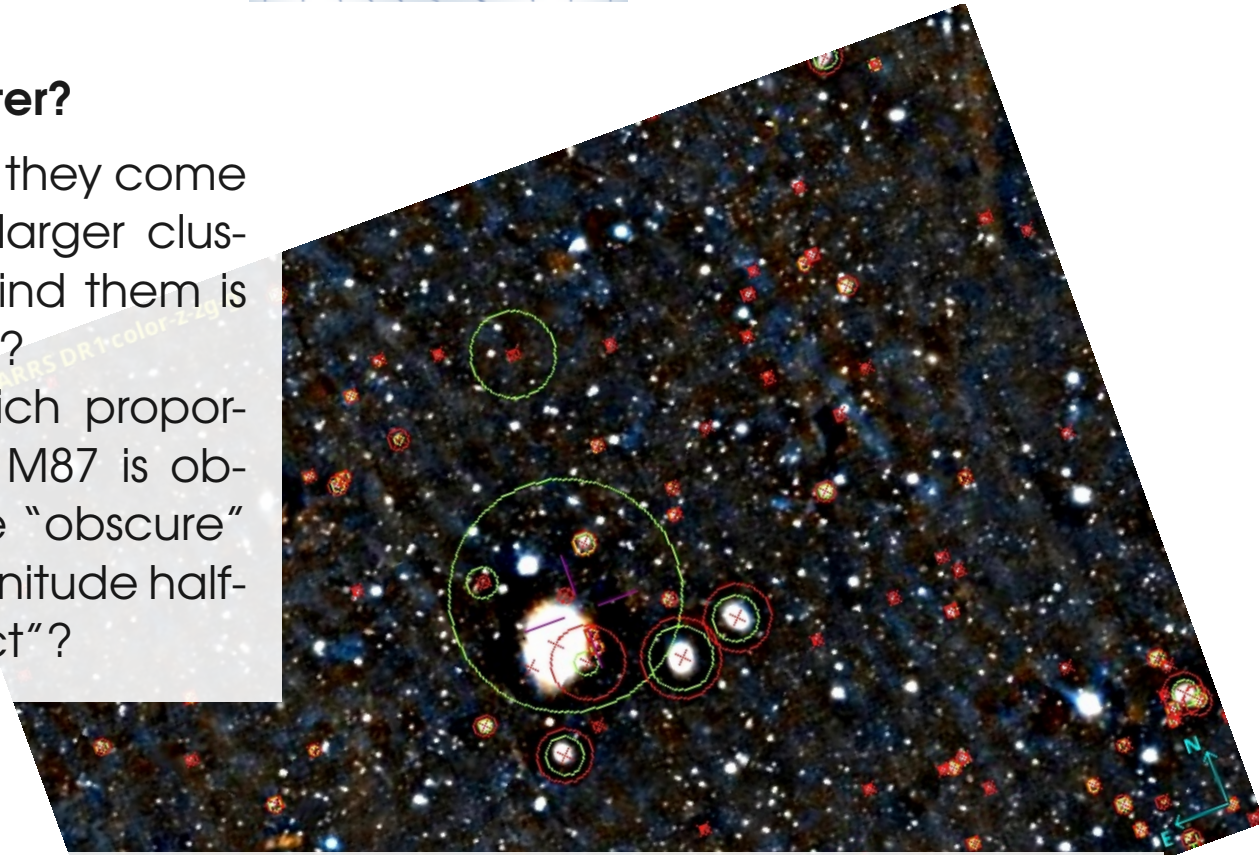
Win our great 70 cm × 140 cm **towel** showing Phobos in front of Mars' limb.

There is a computer at our booth you can use to **solve** the puzzler with all recommended software installed.

At our booth, about 15 minutes into the coffee breaks on Tuesday and Wednesday, we will give a **hint** – every time a new one. Plus, of course, we're always there to help with VO problems of all kinds, including this one.

You can solve this problem in one **ADQL query** over the 2MASS extended source catalogue (and we would like to seduce you to do just that). Due to the wonky ADQL geometry implementations on many VO TAP servers, it is better if you do not use ADQL's AREA here. It's fine to compute the area of the spherical circles here as πr^2. This is even good for the 1-degree circle, the area of which actually is 3.1415 to five significant digits, computed rigorously.

If all the **odd abbreviations** make your head spin, have a look at `https://docs.g-vo.org/vocourse` and drop by our booth.

Hand in your solutions at the GAVO booth. Solutions on Tuesday get three tickets for the raffle, on Wednesday, you get two, on Thursday, one.

The **winner** will be drawn at our booth during the Thursday afternoon coffee break. Please be there if (and who would not?) you participate!

We will post a **solution** on our blog at `http://blog.g-vo.org/` some time around then.

An **archive** of previous puzzlers and their solutions is at `http://www.g-vo.org/puzzlerweb`.