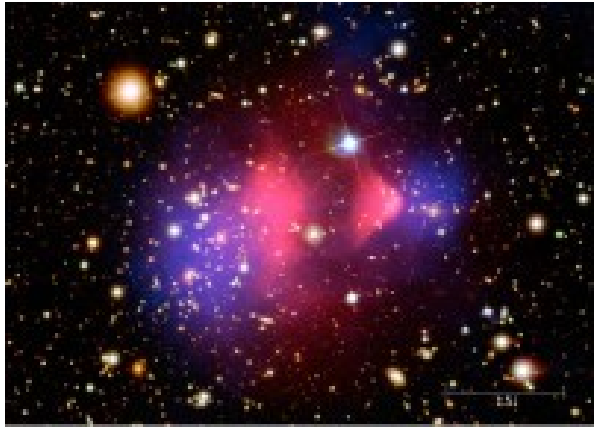
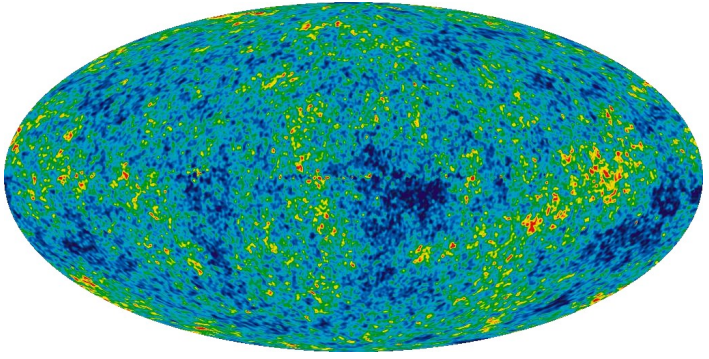
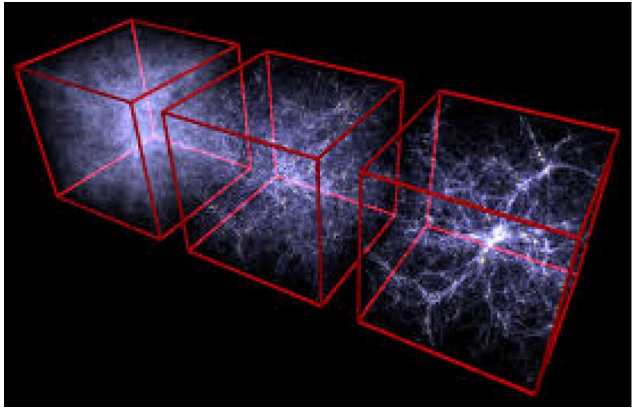
The Dark Side of the Universe







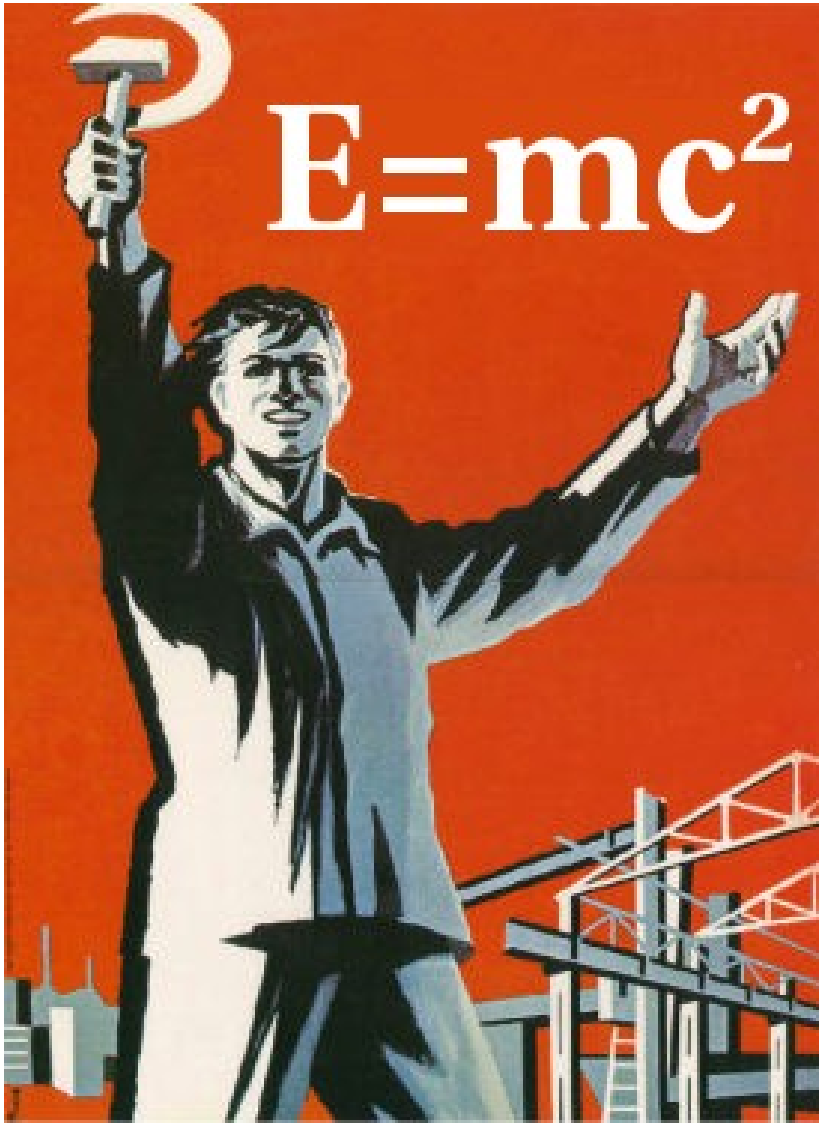
David Schaich --- www.davidschaich.net

Who I Am


Iceland
Sweden
Canada
Poland
Ukraine
United States
North
Atlantic
Ocean
Turkey
Algeria
Libya
Egypt
Mexico
Mali
Niger
Sudan
Chad
Nigeria
Venezuela
Colombia

Why I’m Here

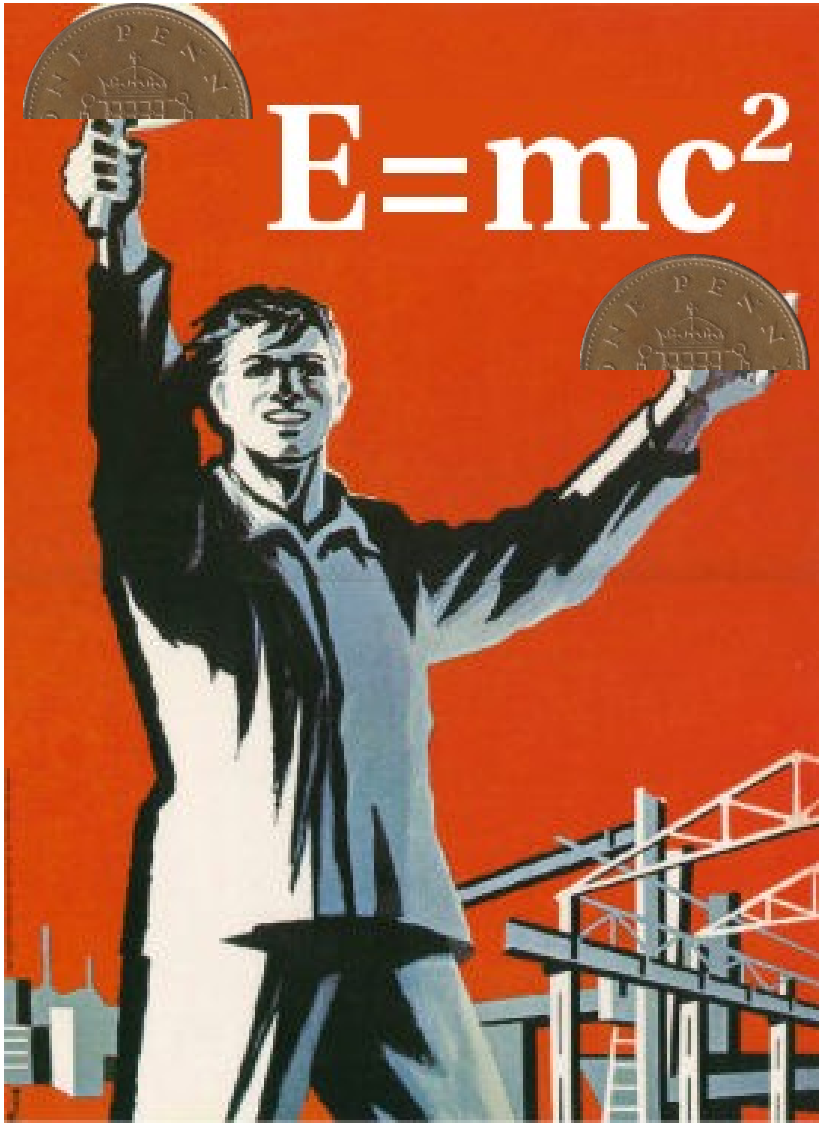
Science and its benefits belong to us all



Why I’m Here

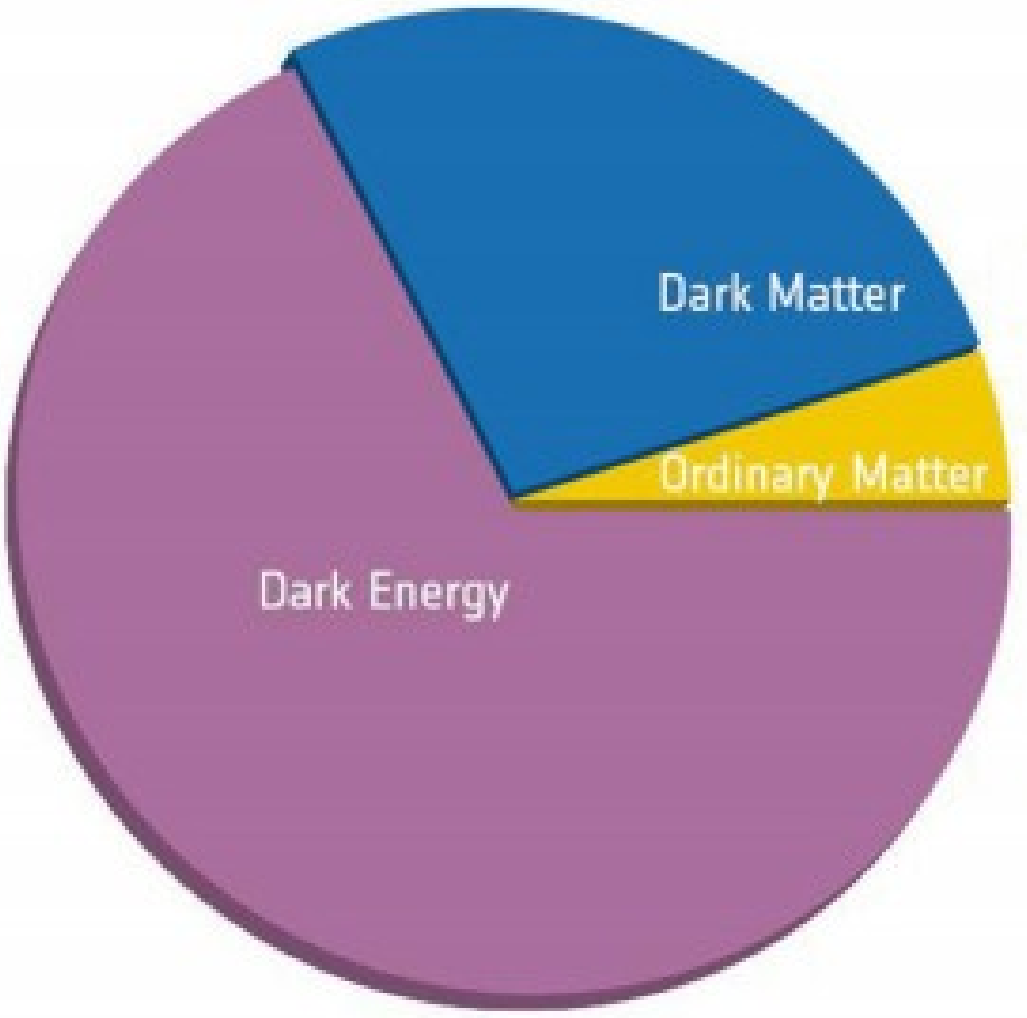
Science and its benefits belong to us all

And you can get what you’ve paid for



Dark matter

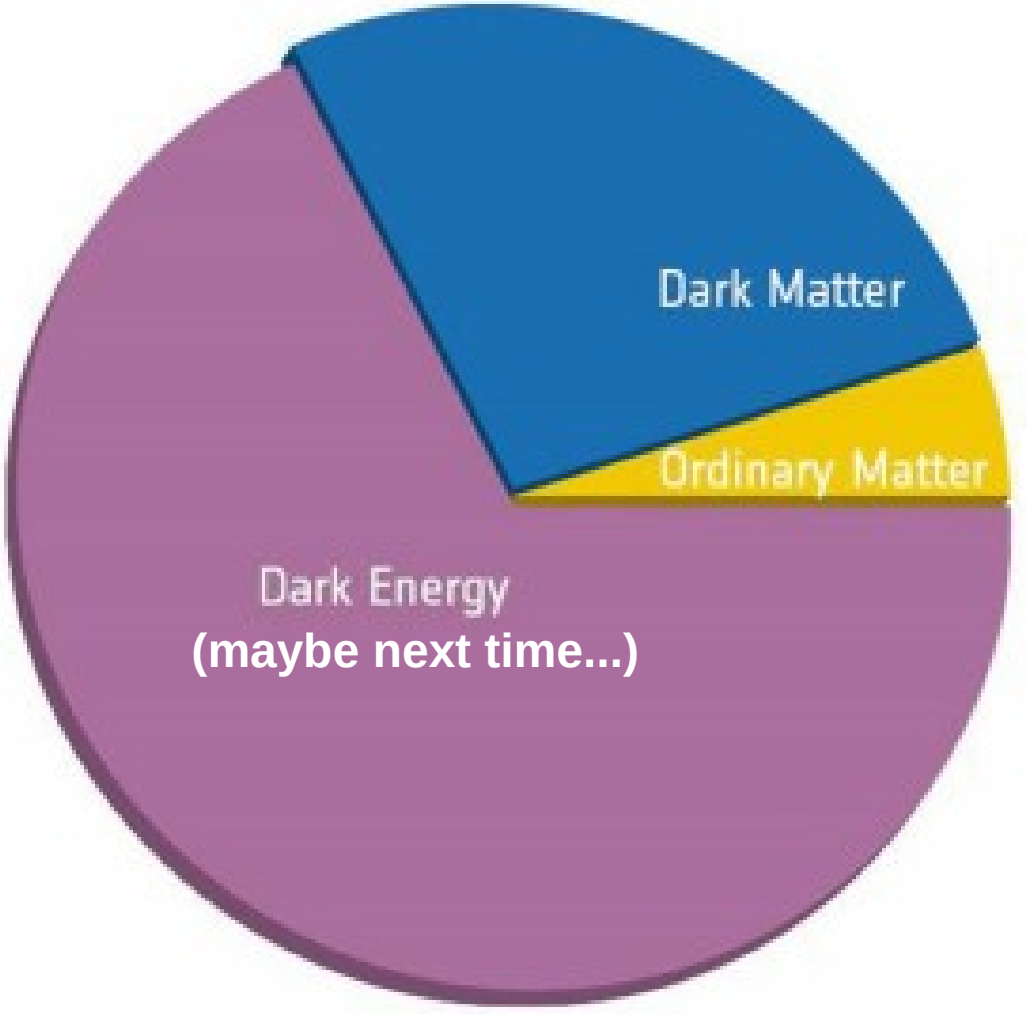
Who’s heard of it?



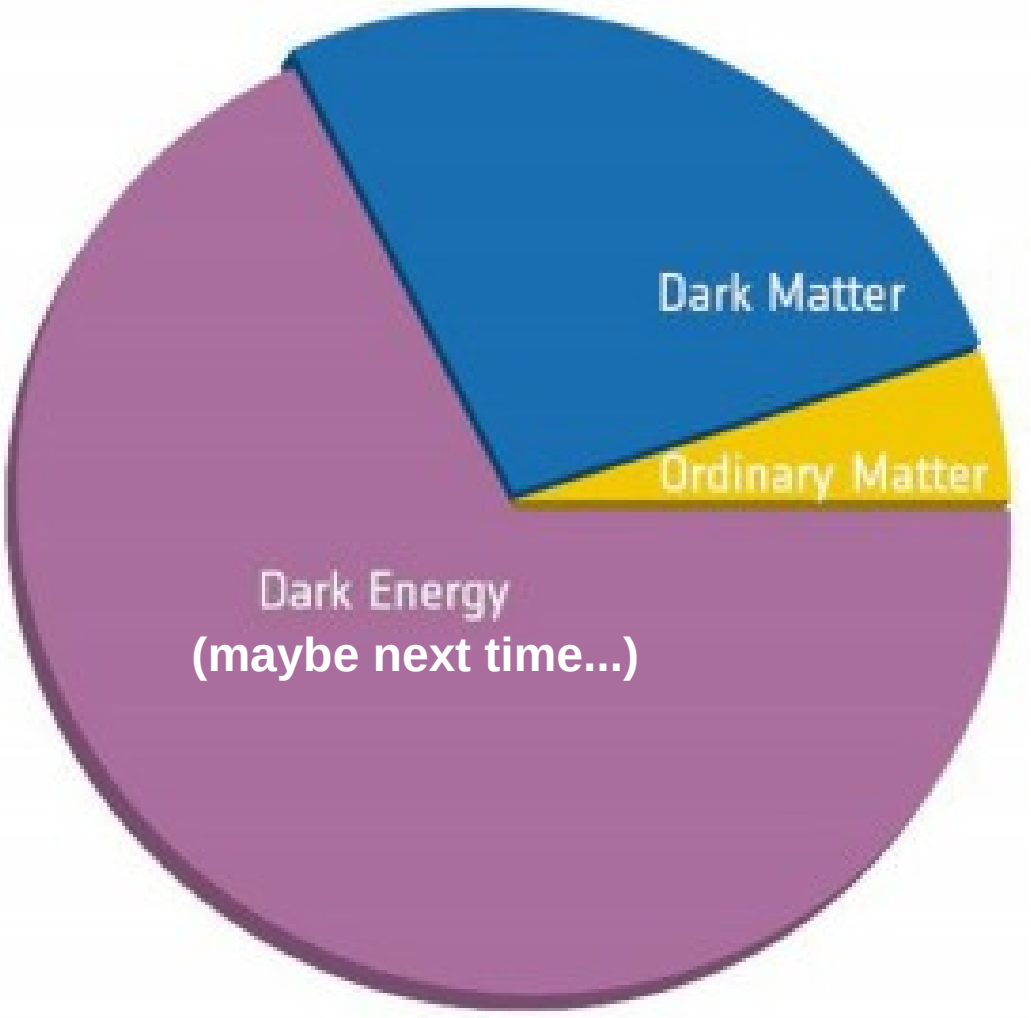
Dark matter

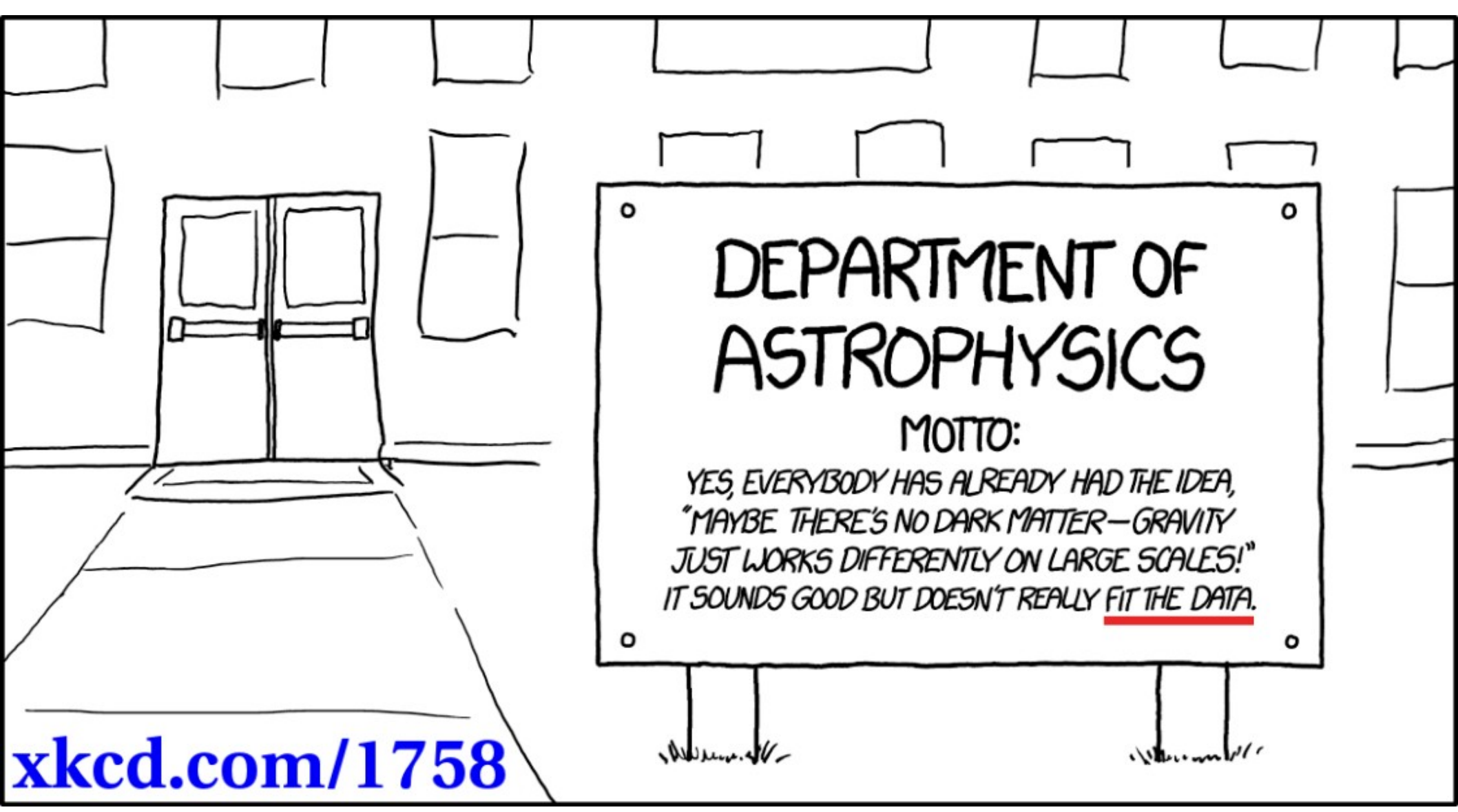
~85% of all matter

Unlike anything handled on earth

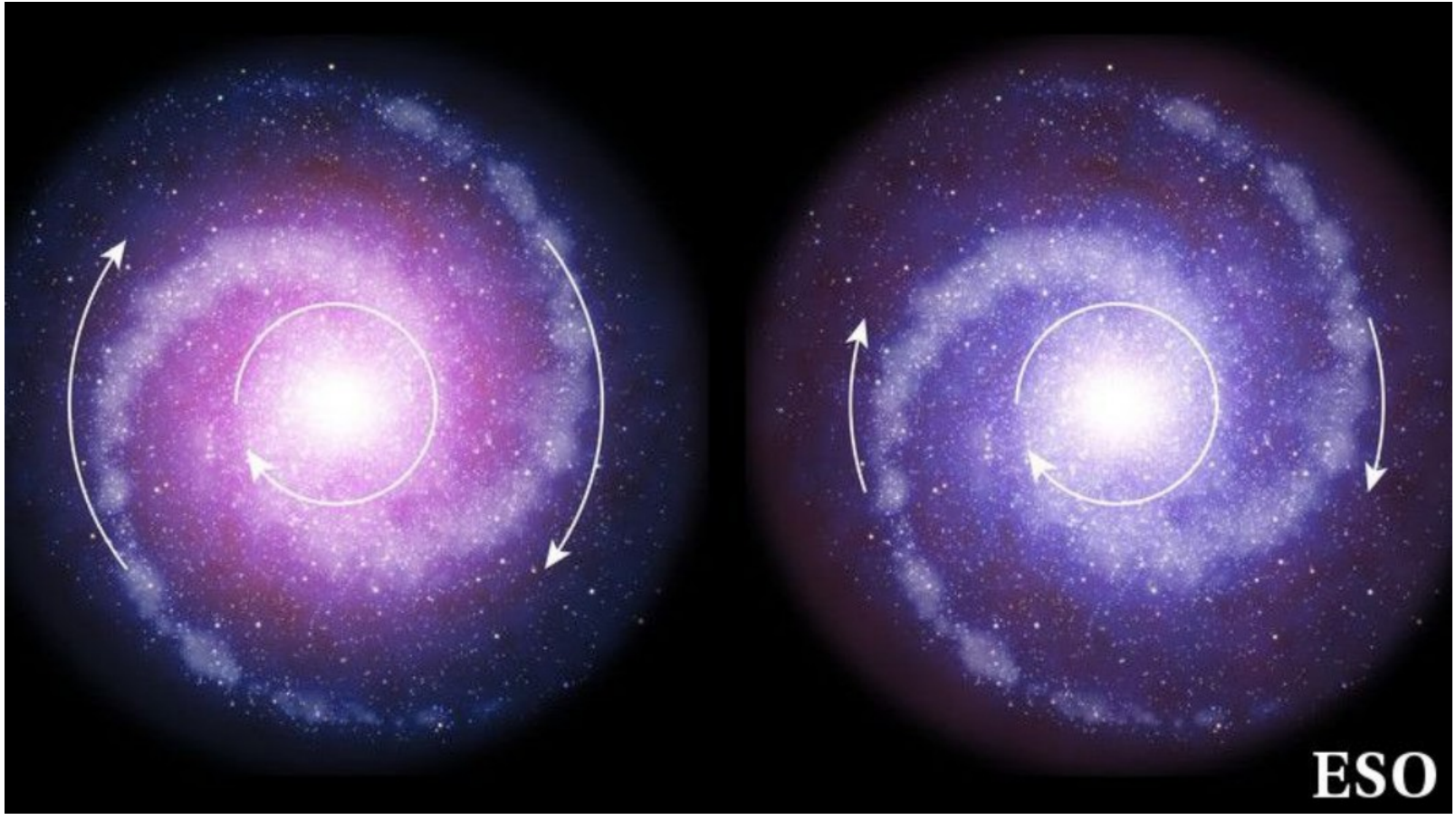


How did we reach this scientific consensus?




DEPARTMENT OF ASTROPHYSICS
MOTTO:
YES, EVERYBODY HAS ALREADY HAD THE IDEA, "MAYBE THERE'S NO DARK MATTER—GRAVITY JUST WORKS DIFFERENTLY ON LARGE SCALES!" IT SOUNDS GOOD BUT DOESN'T REALLY FIT THE DATA.
xkcd.com/1758

Galaxy rotation



Fritz Zwicky, ~1930s

Something’s missing…

Fritz Zwicky, ~1930s

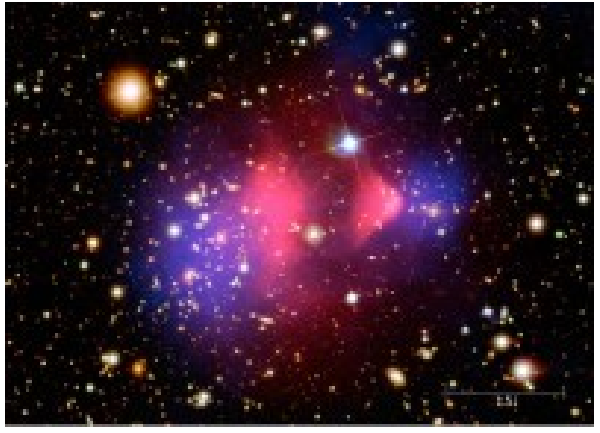
Something’s missing…

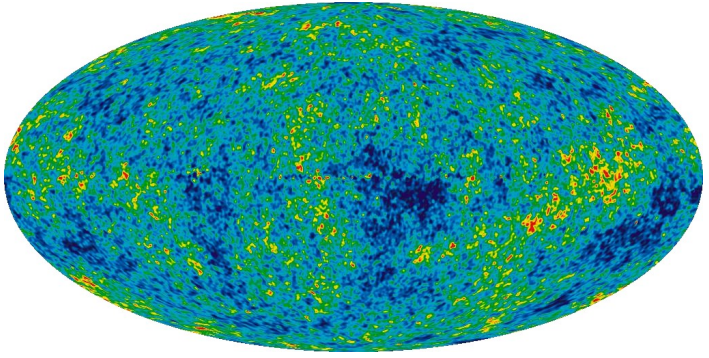
Vera Rubin, ~1970s

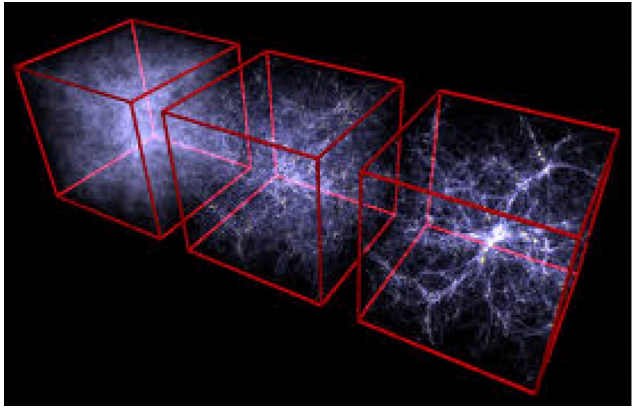
…it’s something different

Independent confirmations

Consistent evidence
from many different sources

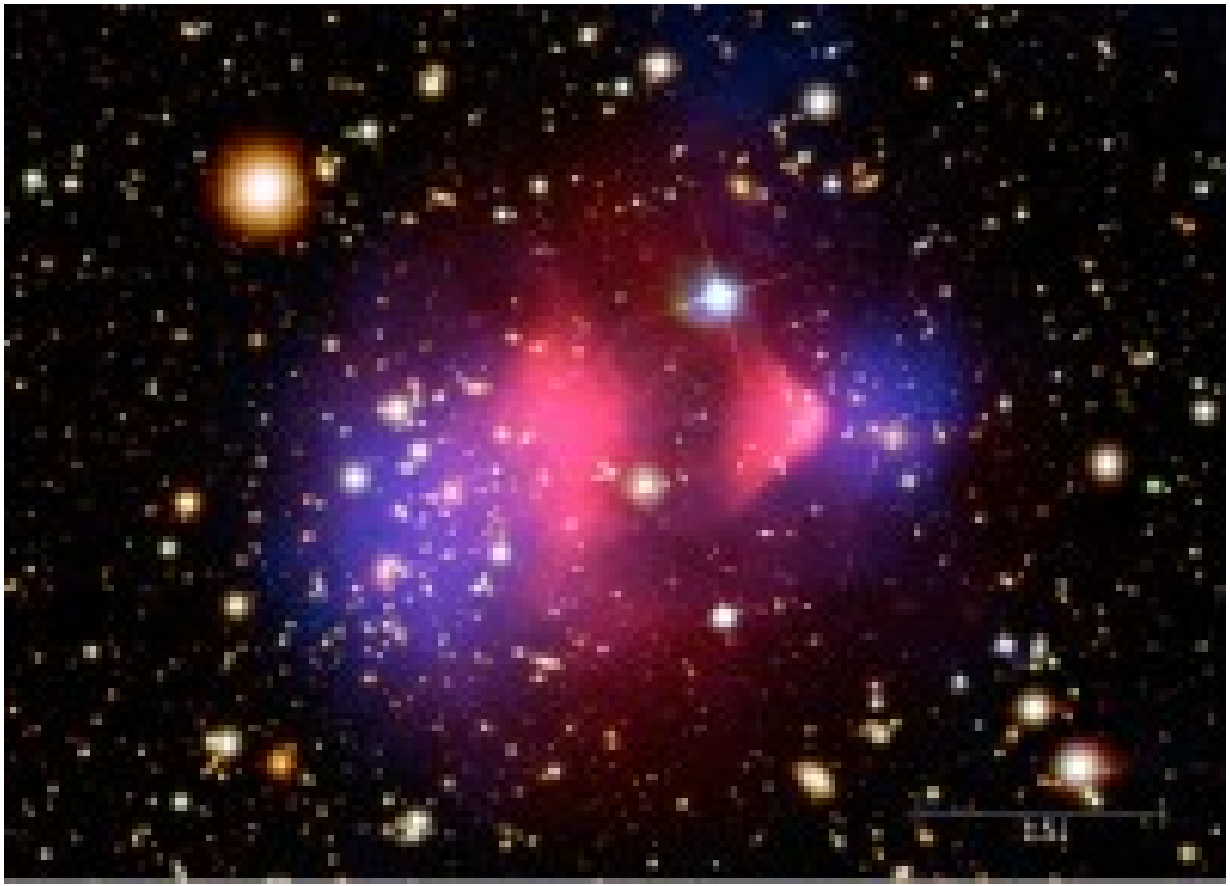






Gravitational Lensing

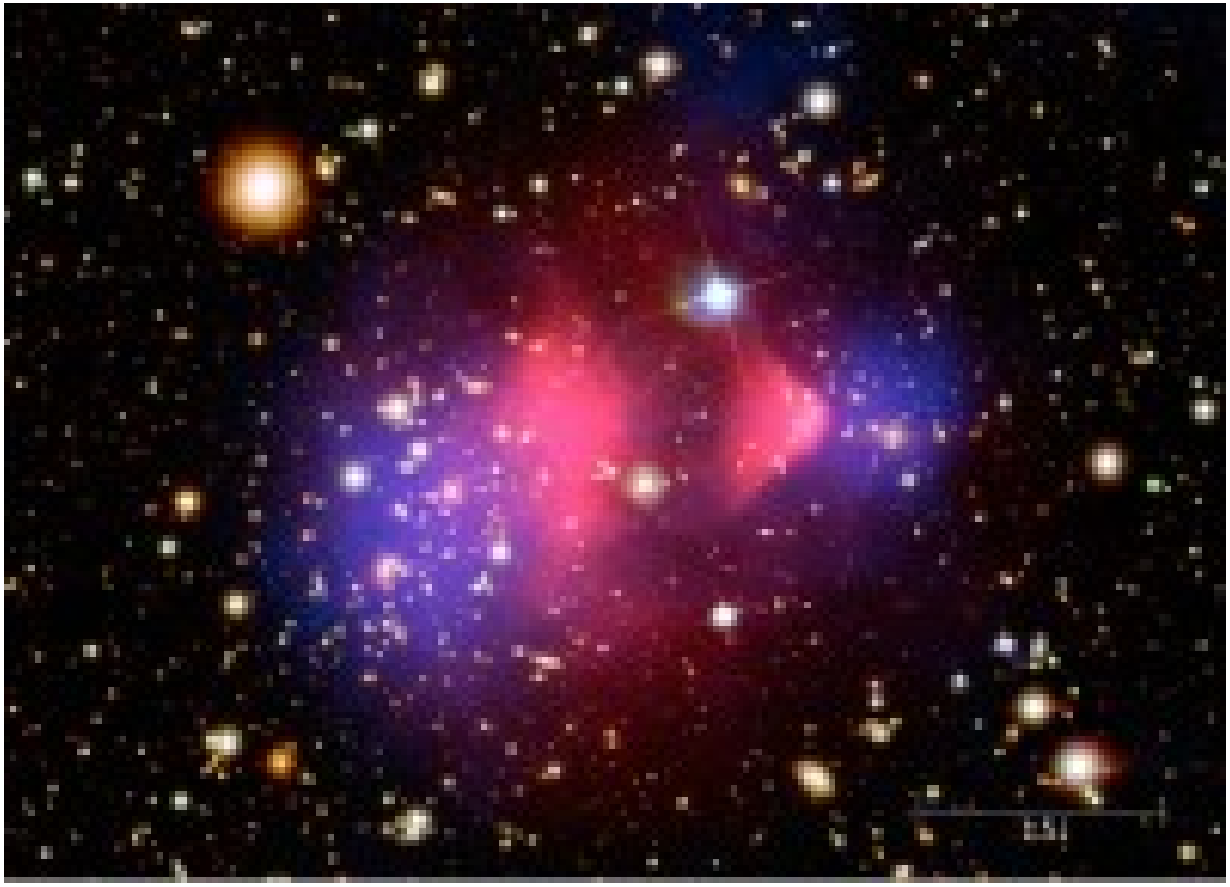
~1000 times
galaxy size



Gravitational Lensing

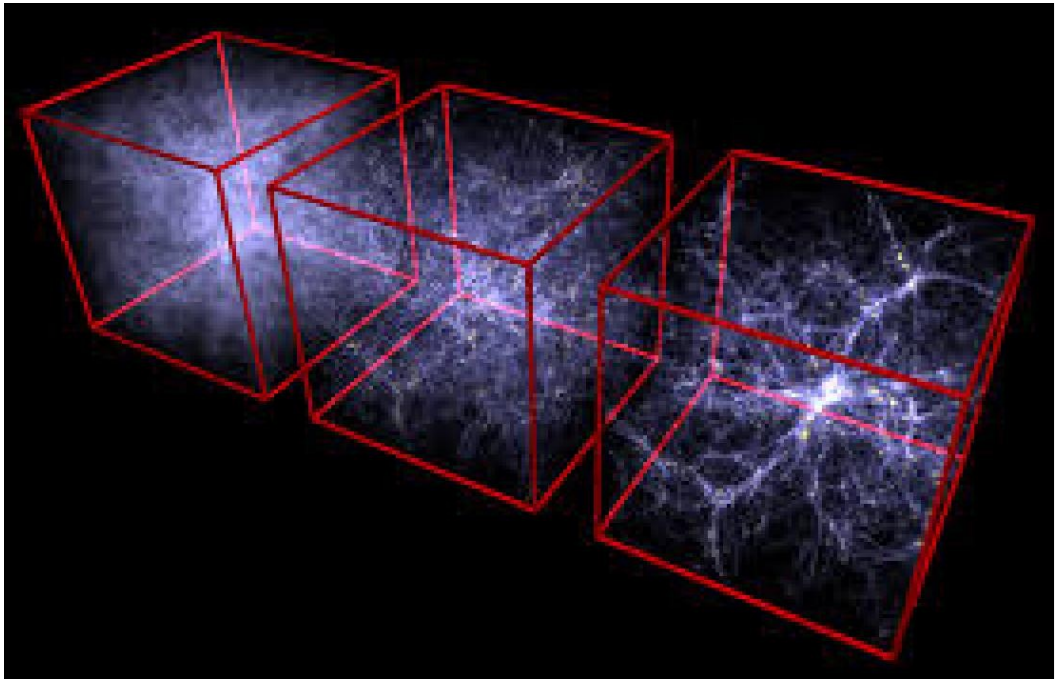
Blue: All matter

Pink:
Ordinary matter



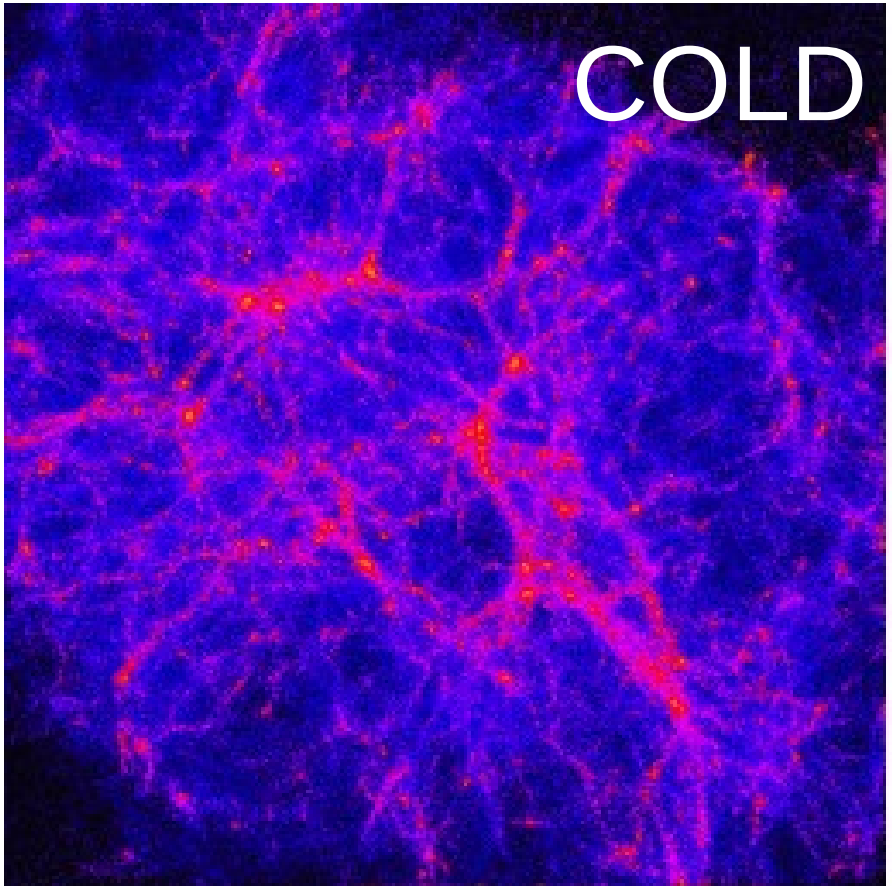
Large-scale structure

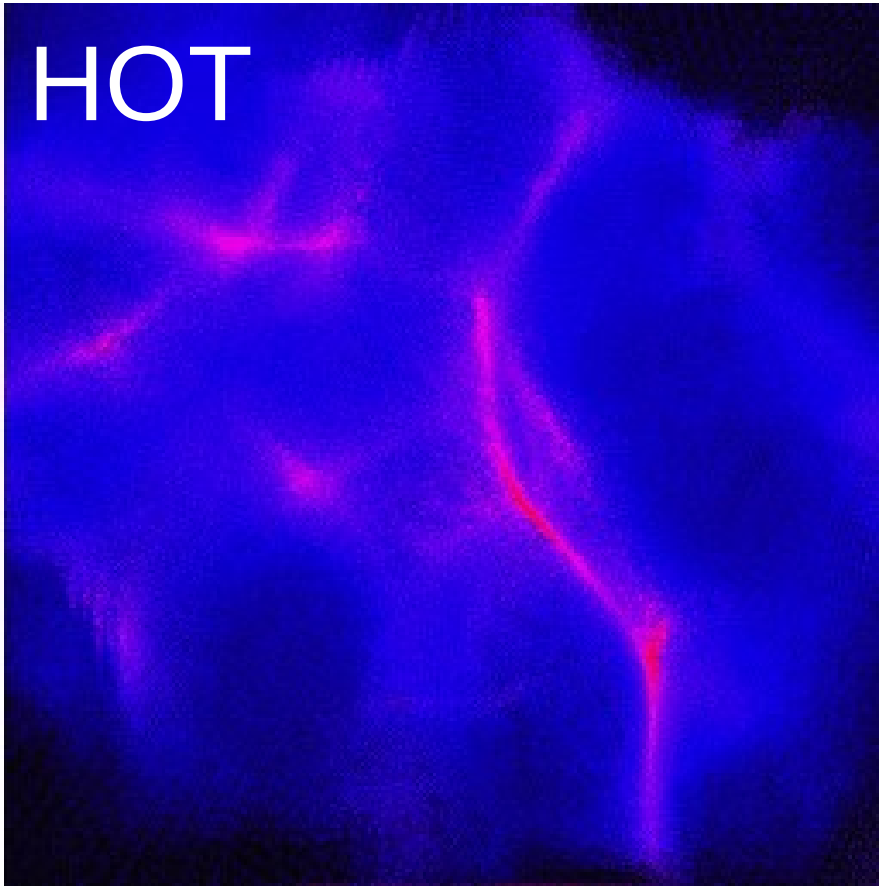
~1,000,000 times
galaxy size



Computer simulation vs. observation

Large-scale structure





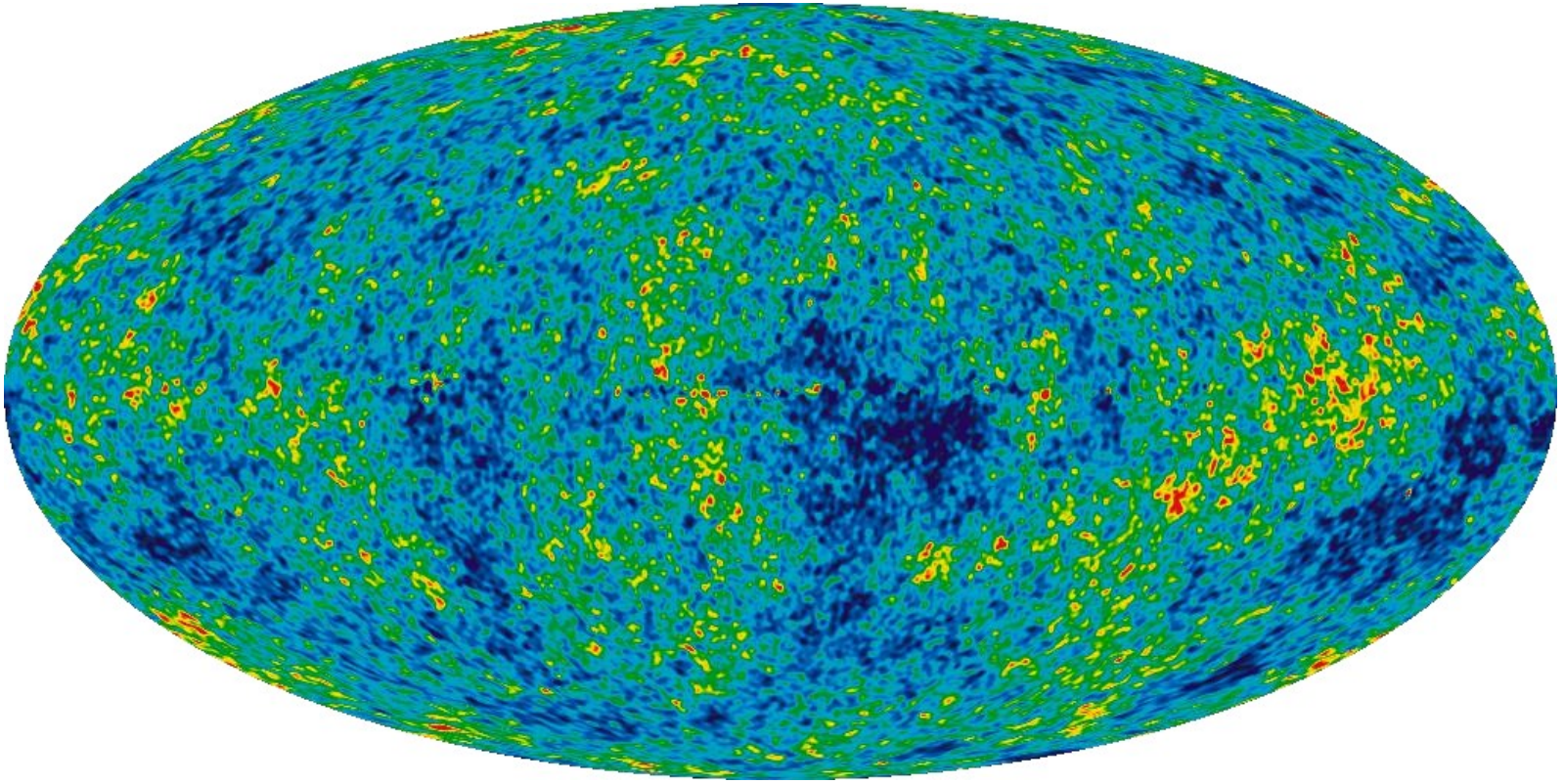
TLDR

No (cold) dark matter

→ No Milky Way

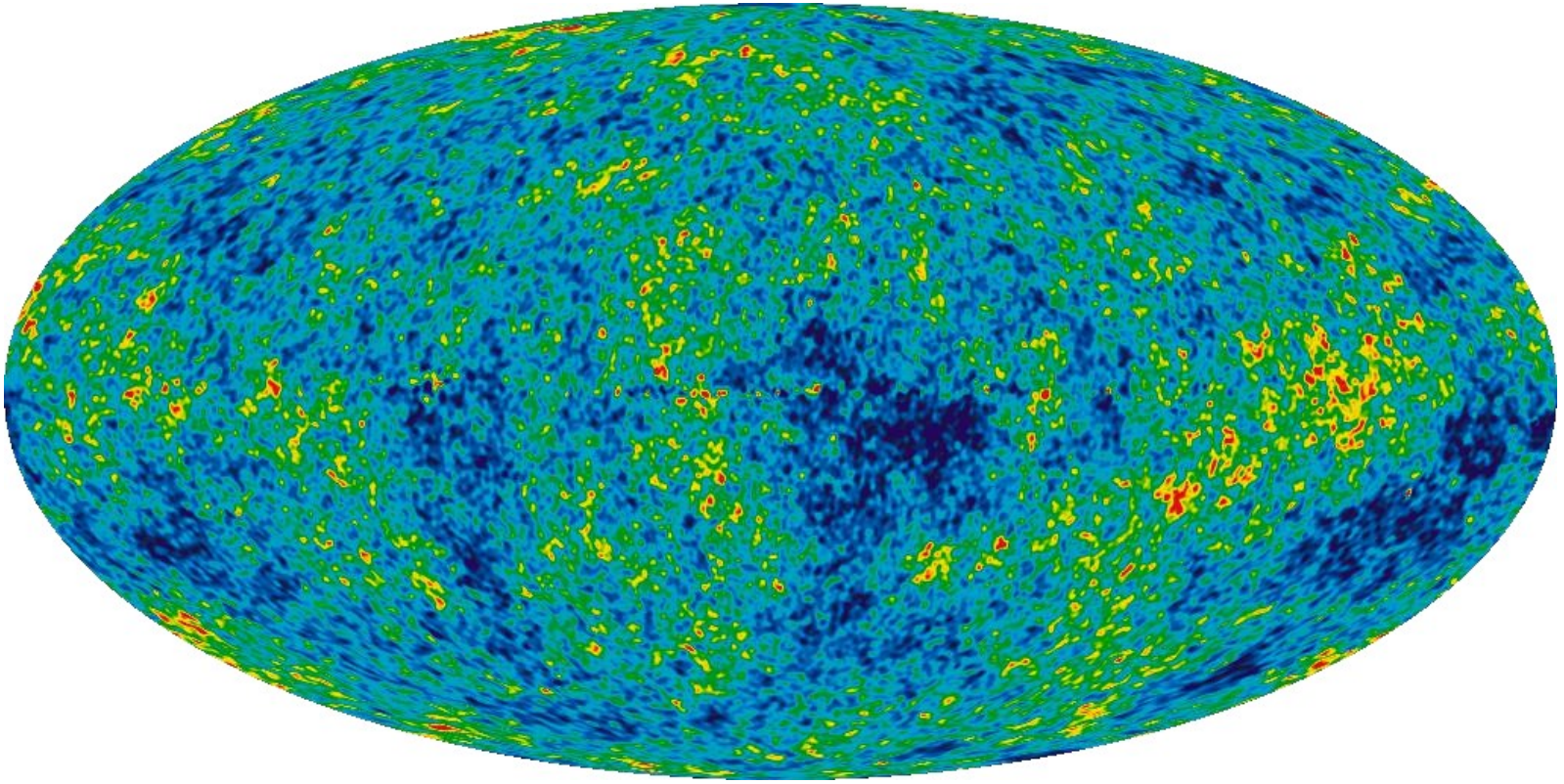
→ No us

Across the Universe



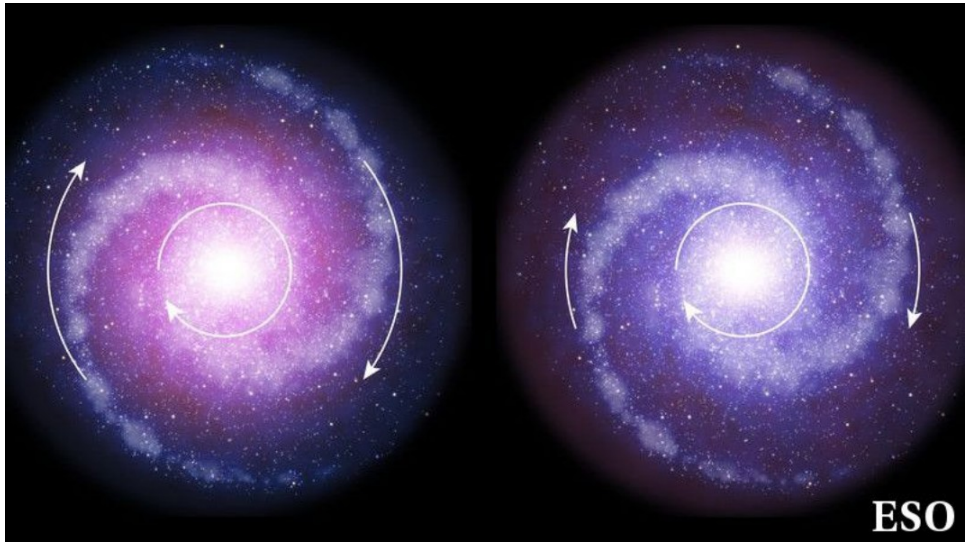
~10,000,000 times galaxy size

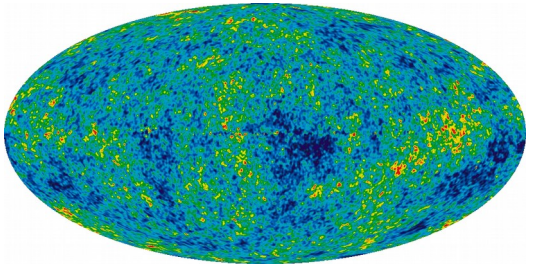
Across the Universe

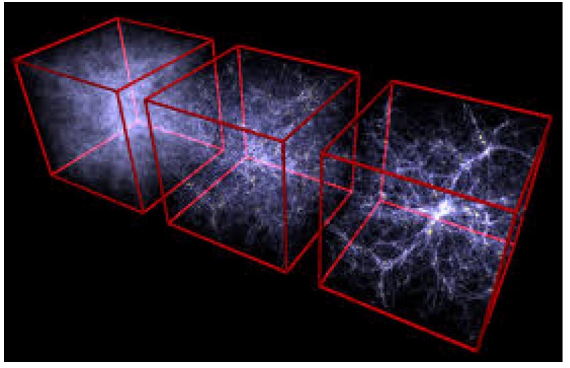


Pattern depends on dark matter

Dark matter because data







For more: davidschaich.net