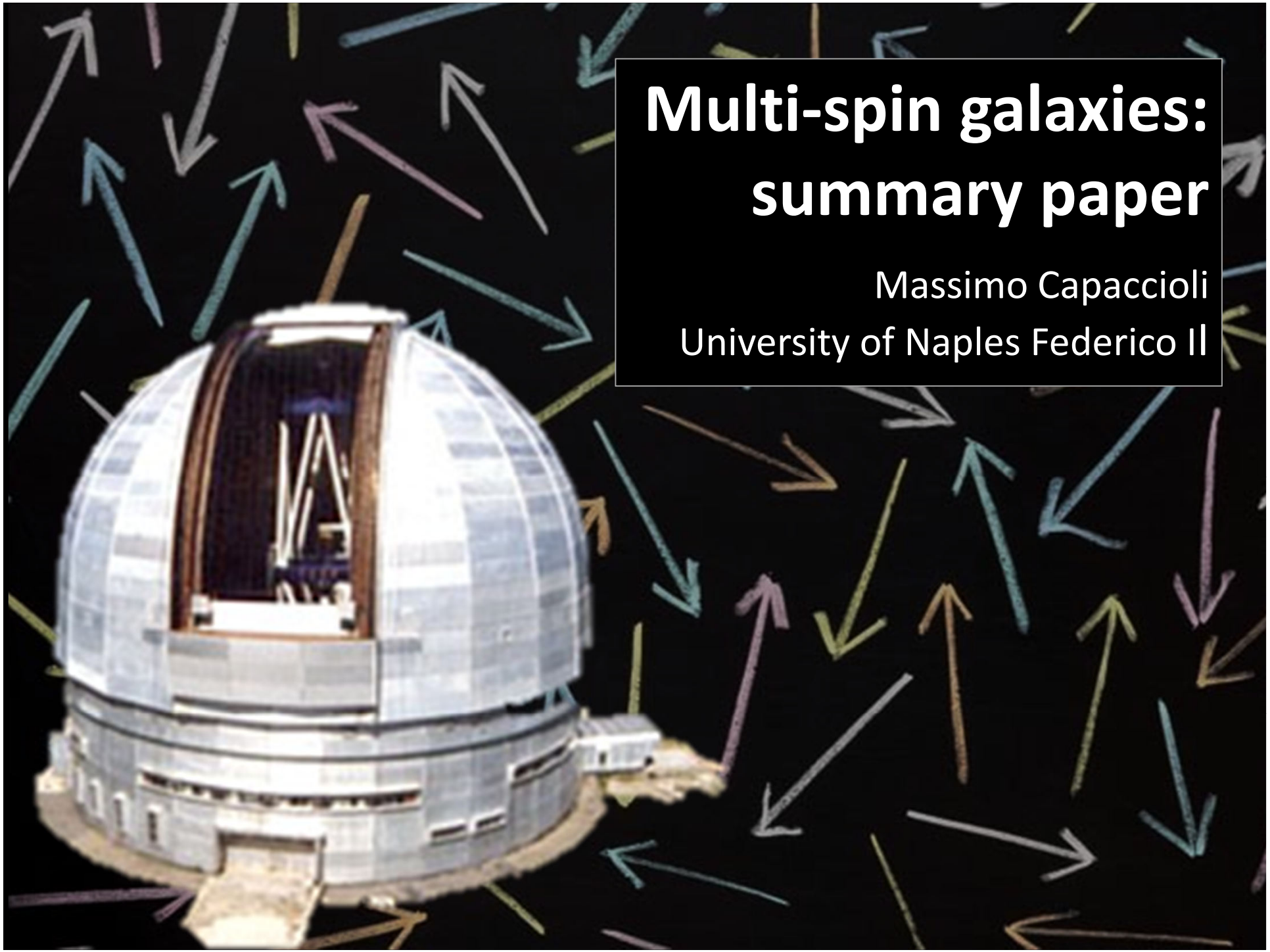
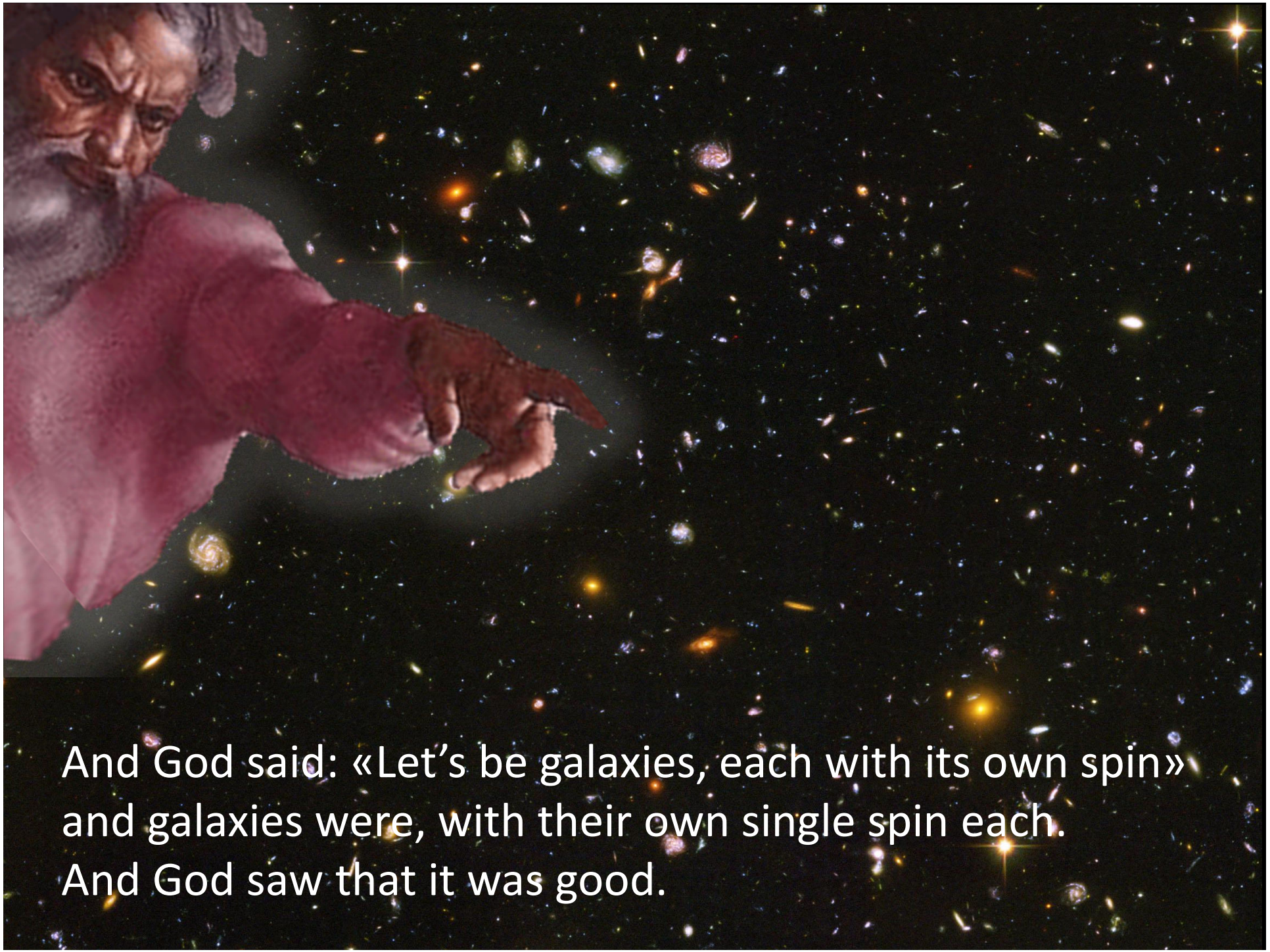


Multi-spin galaxies: summary paper

Massimo Capaccioli
University of Naples Federico II

A major discovery:
a new Dead Sea scroll found in a cavern


And God said: «Let’s be galaxies, each with its own spin»
and galaxies were, with their own single spin each.
And God saw that it was good.


Then Lucifer let galaxies discover the pleasure of multispin

MSGs as illustrations of interactions:
secondary evolution

2013

William Hogarth

2016

William Hogarth

The meeting as it was

- Perfect organization
- Intriguing location
- Warm hosp… …torium)
- Intere…
- Excellent pa… (10 invited; 14 contributed)

спасибо

The meeting *as I perceived it*

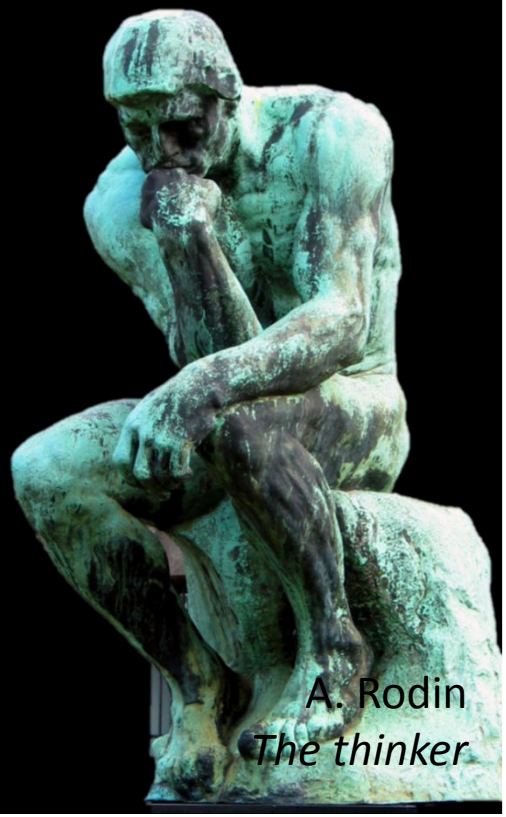
I collected a lot of information and I was truly delighted by some new results and by the high class of the data: reviews, reports on large/medium surveys, and detailed studies of single/few cases …

BUT

I go back home with more doubts than certainties.

What is still missing is a **UNIFIED PICTURE**:

1. classification of the phenomenology;
2. interpretation implying a small set of parameters.



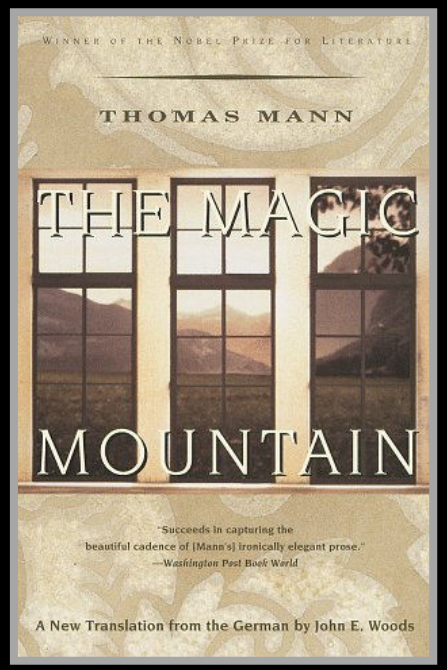
A. Rodin
The thinker

Why do you want to classify MSGs?

"*You ask what is the use of classification, arrangement, systematization. I answer you; order and simplification are the first steps toward the mastery of a subject - the actual enemy is the unknown.*"

Settembrini to Hans Castorp in Thomas Mann's *The Magic Mountain*

Thomas Mann
(1975-1955)



Quoted by Sandage:
http://arjournals.annualreviews.org/doi/full/10.1146/annurev.astro.43.112904.104839

Current jargon

Thin vs thick

Quenching

Counter-rotation

Spin

Morphology

Oblate vs prolate

Interaction

Gas

Dust

New physics

Tracers

Stars

Merging

Rings

Halo

Prolate

Feedback

Satellites

Sub-components

Disk

Voids

Spiral structure

Bulge

Flattening

Star formation

Downsizing

Ionization mechanisms

Spin galaxies

An Eldorado for extragalactic investigation

Pathologies can help understanding what normality conceals

Why MSGs ? Interactions help understanding

In a junkyard you see more that in a parking lot

But the road is rough

First problem is semantic:

how do we define the MSG Class ?

A. Pizzella

Paolo Uccello, Saint Roman Battle

First problem is semantic:

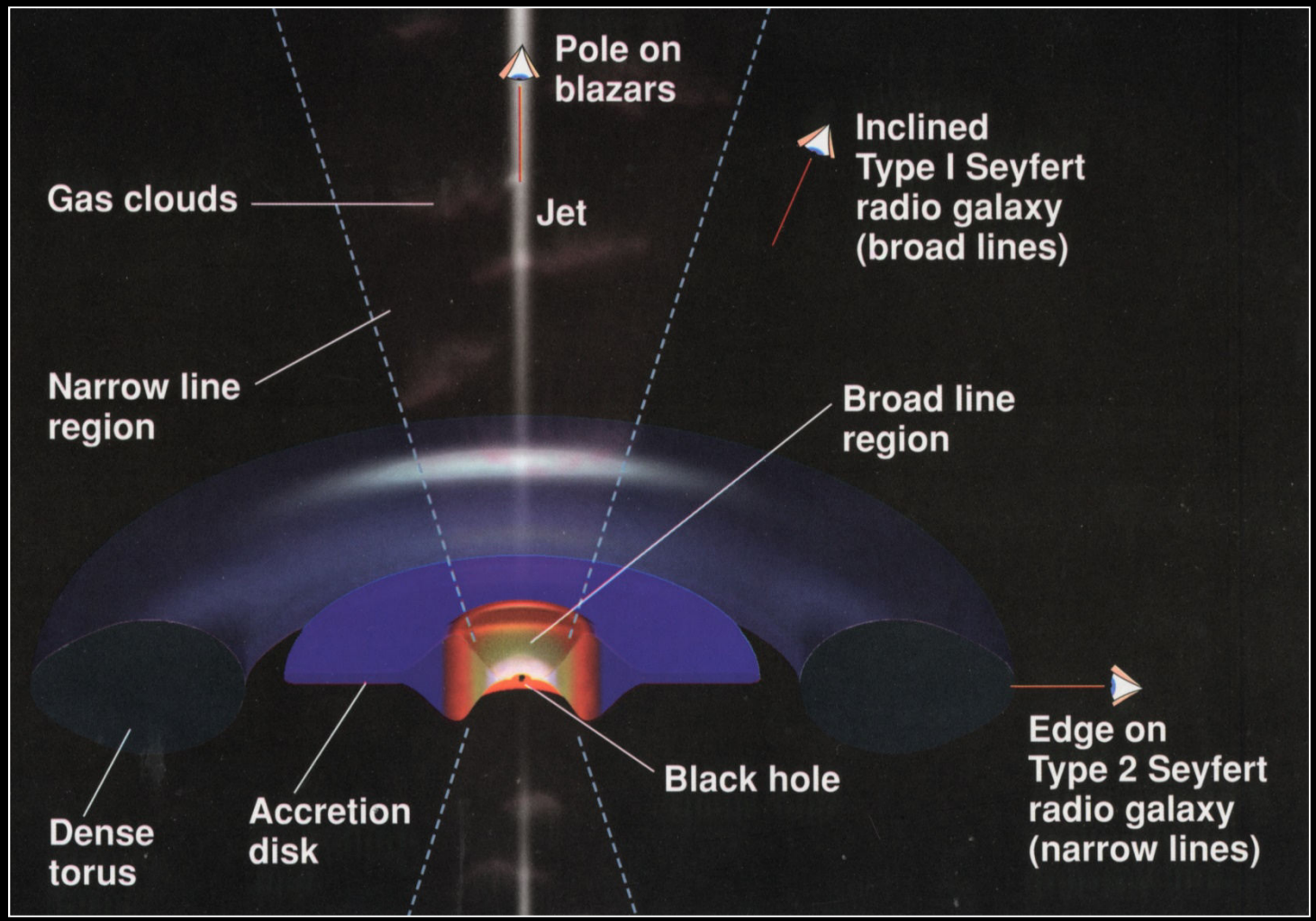
how do we define the MSG Class ?

For instance,
one may accept that a galaxy is multispin (MS)
if it exhibits subcomponents
with different orientations of their spins,
obviously as a consequence of an interaction.

But this opens to various sub-problems.
One of them is completeness:
the cases of weak interactions or past interactions
will not be included.

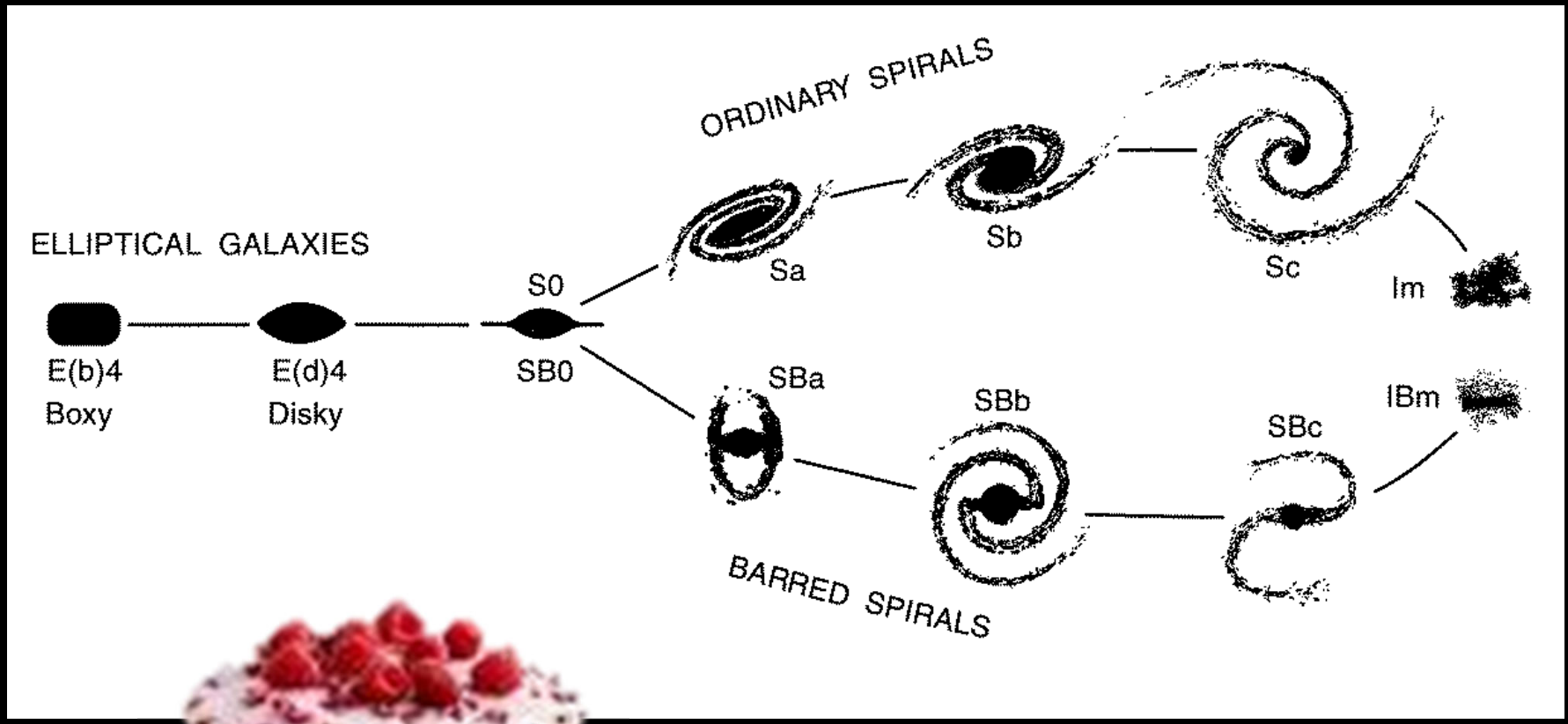
AGNs *docent*

think to the unified model, or to SNe classification



The second problem is just a pre-requisite:

how do galaxies form and segregate morphologically ?



If you ignore the ingredients,
how can you make the cake ?

The enigma of gravity

Classical (relativistic) view implies DM

Can we «save the apparances» by a new physics?
MOND, *f(R)*… ?

Dynamical friction in science

The discovery of variability in AGNs

A. de Vaucouleurs 1972
… but the paper was never published

Ingredients to take into account in building a unified view of MSGs

1. Environment and its evolution
2. 3D structure
3. Induced evolution
4. Low surface brighness
5. Projection effects
6. DM
7. Time
8. Players (stars, gas, dust …)
9. Metallicity

D. Bettoni

N. Brosch

P. Kroupa

G. Jòzsa

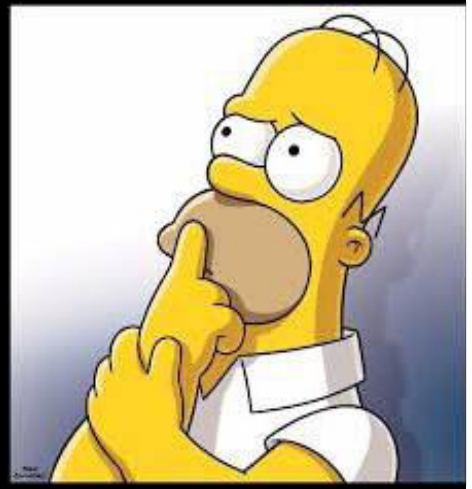
O. Egorov

E. Egorova

D. Makarov

A.L. Melchior

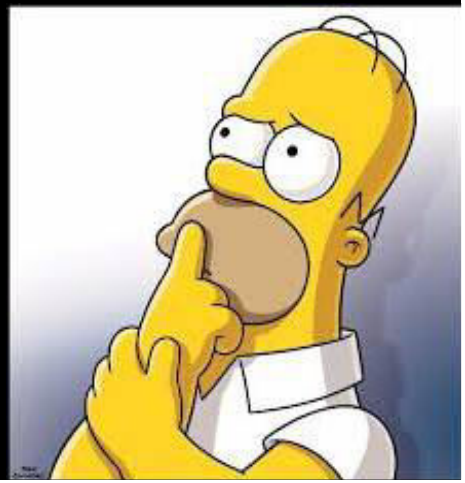
E. Vasiliev



Parameters to take into account:

1. Other tracers
2. Winds
3. Star formation
4. Accretion

A. Kniazev
C. Lopez Coba
I. Proscina
S. Pustilnik
O. Egorov
A. Zasov



Tools:

1. Photometric
2. Spectroscopic (2D)
3. Multi-wavelength (HI, IR, etc.)
4. Numerical
5. Theoretical
6. Multi-technique
7. 3D decomposition
8. Statistical

V. Reshetnikov
M. Capaccioli
S. Khoperskov
E. Bannikova
A. Katkov

Search for hidden troublers: e.g. bars, or stabilizers: e.g. halos (DM?)

NGC 6782

Be careful with rings:

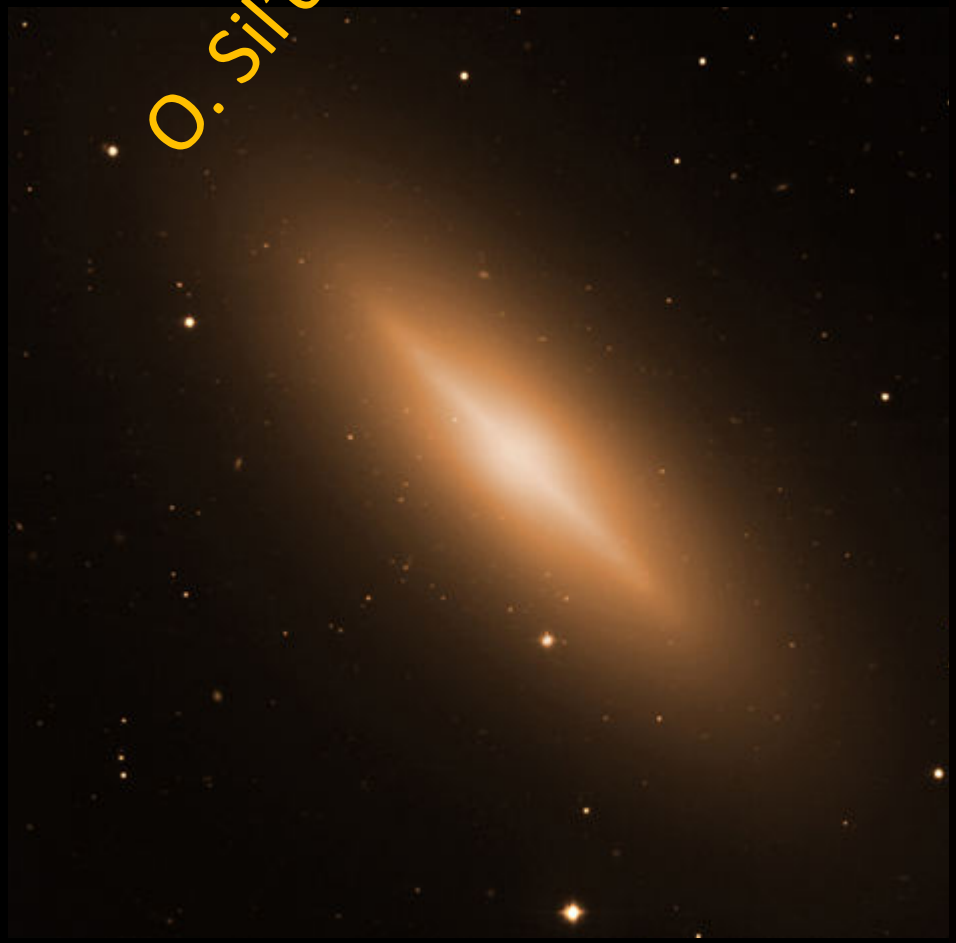
a dog chewing on his tail is not a ring-dog

Do not propagate parameters unnecessarily

and use empirical fits for what they are useful

William of Ockam

The «stars» of the show: S0s and PRGs



O. Sil'chenko

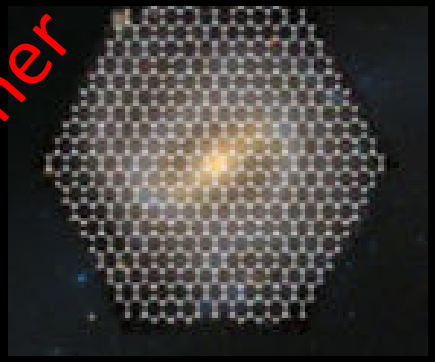
Technological stars: 2D spectrographs

SDSSIII

MaNGA

D. Byziaev

J. Walcher



CALIFA

MPFS

Multi Pupil Fiber Spectrograph

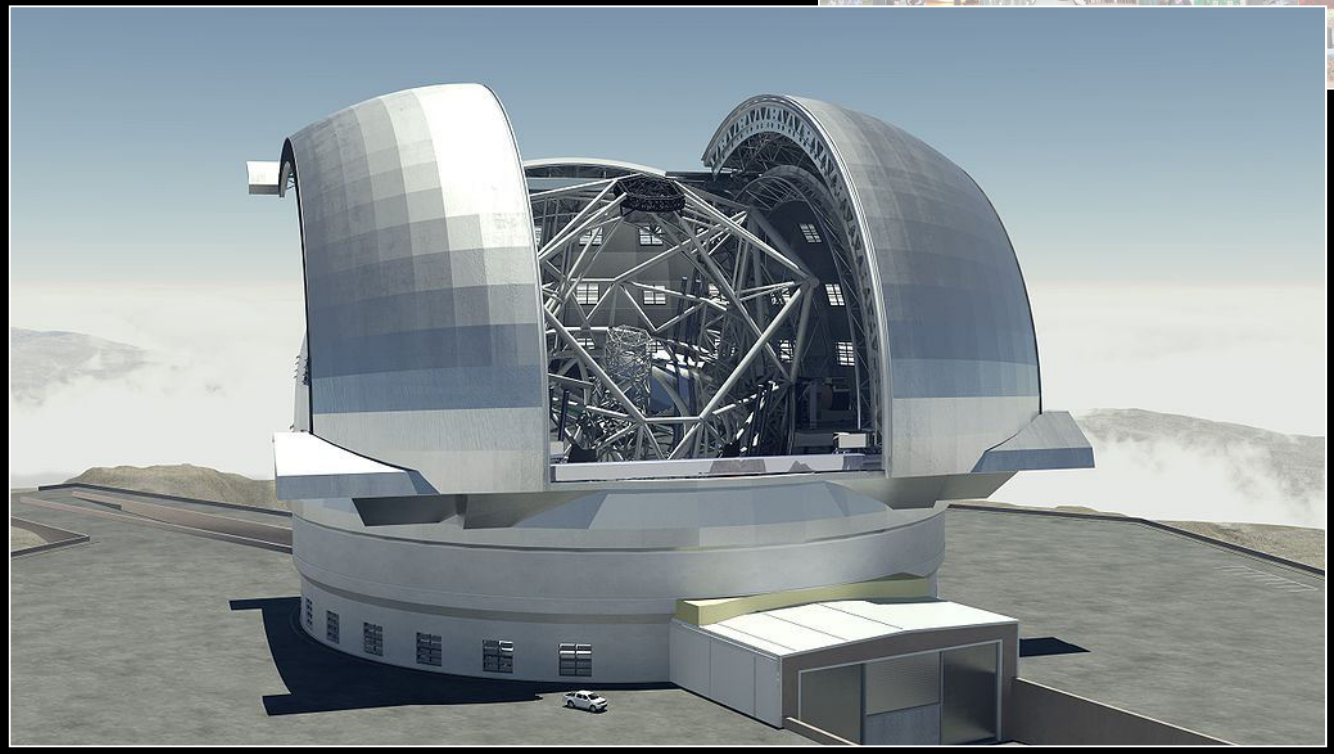
N. Bouche

sami galaxy survey

muse

multi unit spectroscopic explorer

The near (?) future



E-ELT

An immense dataset

Do we have enough astronomers ?

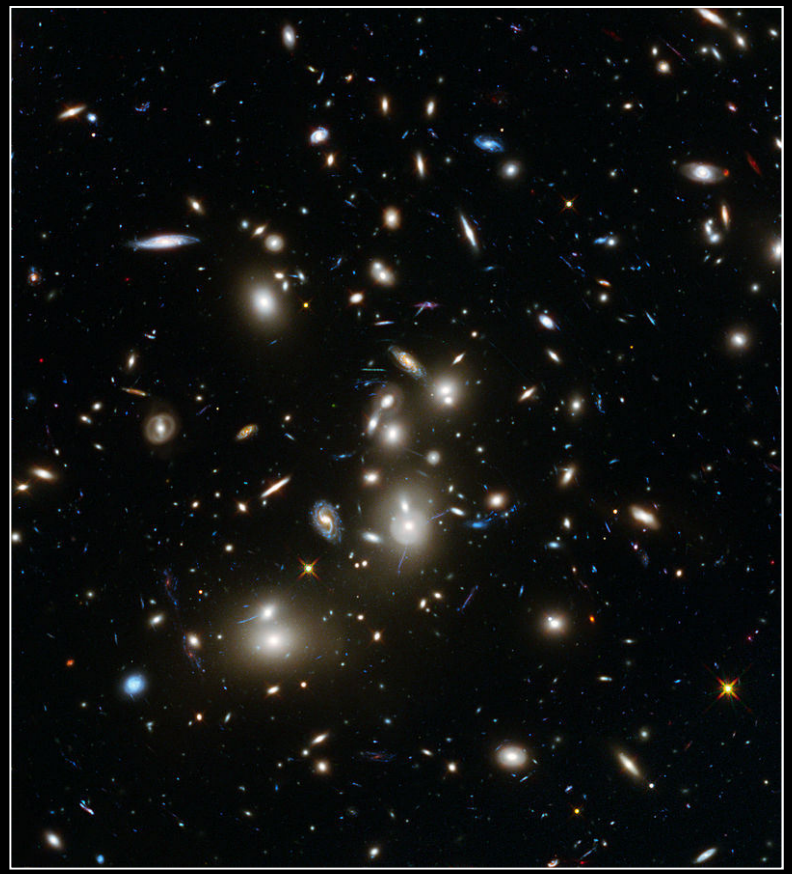
More data … more brains to think of them

Let us invest in universities and research positions!

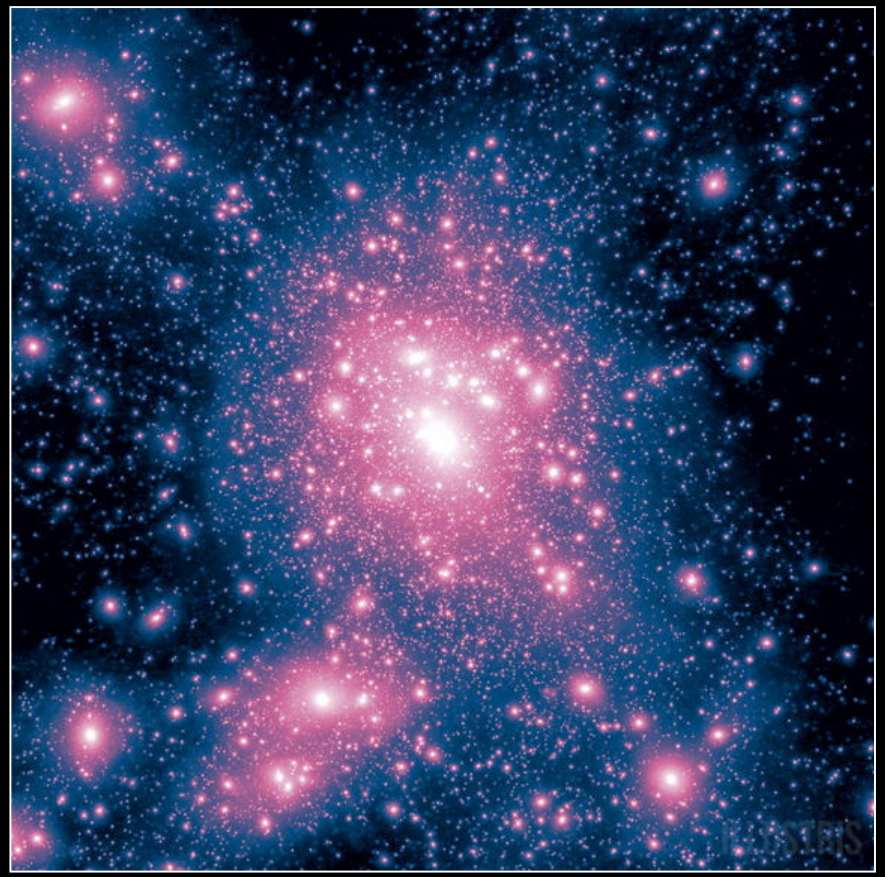
I. Repin, *Barge Haulers on the Volga*

Let us trust more photons than electrons

Quote of Noah Brosch



VS

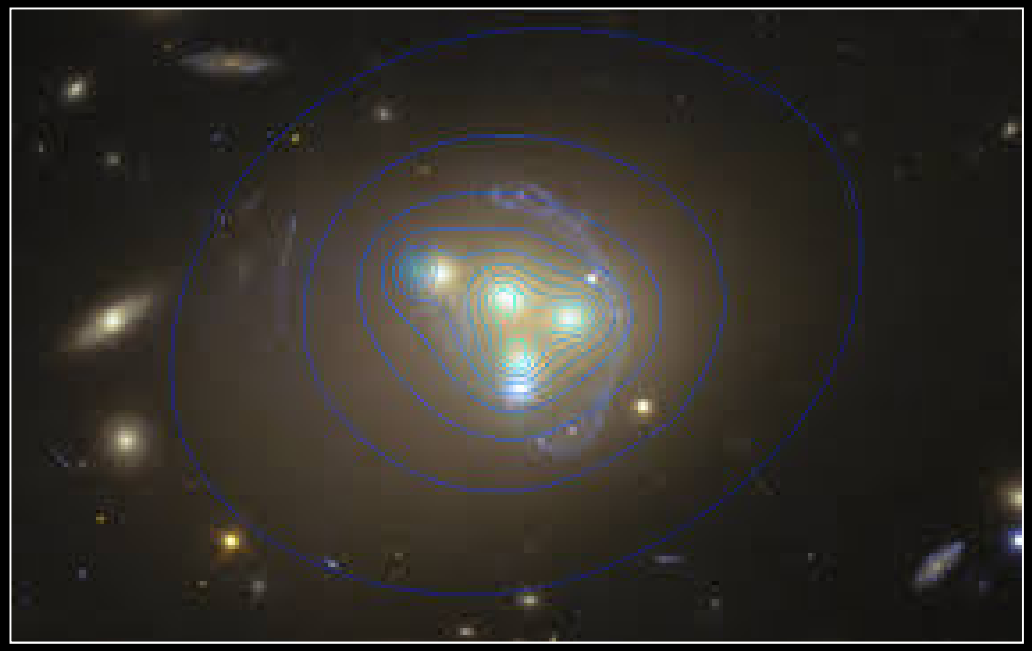


Abell 2744

Illustris

Incomplete physics: an example

Self interaction of DM



Self-interaction cross-section $\sigma_{DM}/m < 0{:}47\ cm^2/g$ (95% CL),
which disfavors some proposed extensions
to the standard model (Harvey et al. 2015)

New physics ?

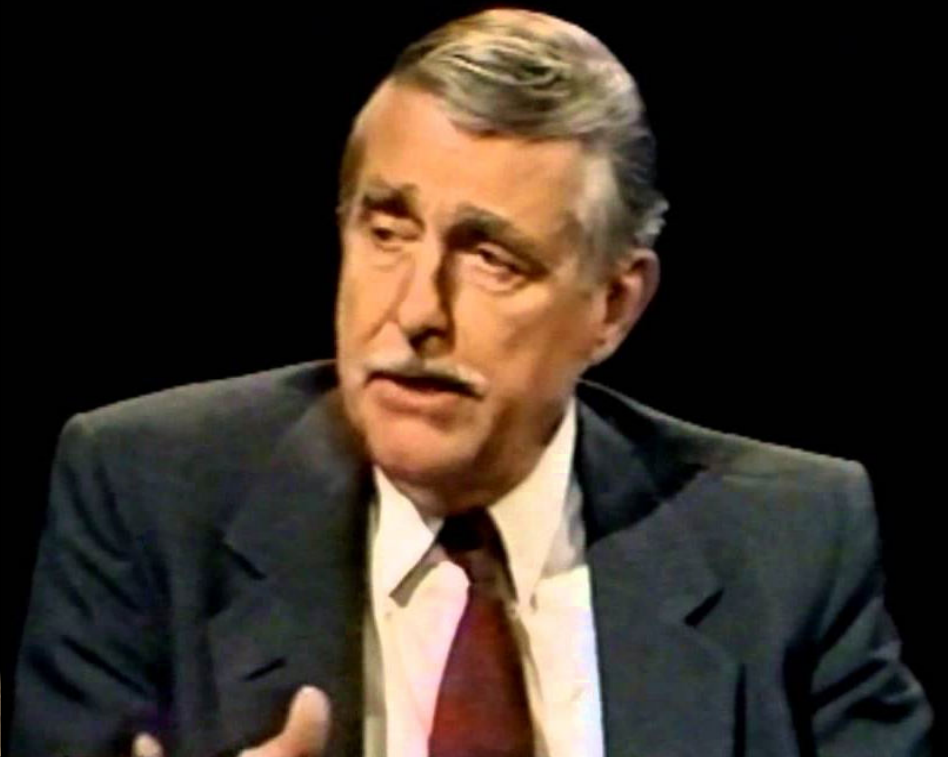
Christopher Columbus and his referees

Salamanca judgment

Good luck … and remember that
crazy (heretic) proposals for
a hard life and a possible future glory

Allan R. Sandage

Halton C. Arp



Long & lively discussions

May be that we all go back home full of d bts,
but conscious that MSGs are a great o ity
to solve a major enigma: how galax ved
morphologically the way they a now.