

Gravitational probes of dark matter

Kfir Blum / Weizmann

UNDARK kickoff meeting 2024



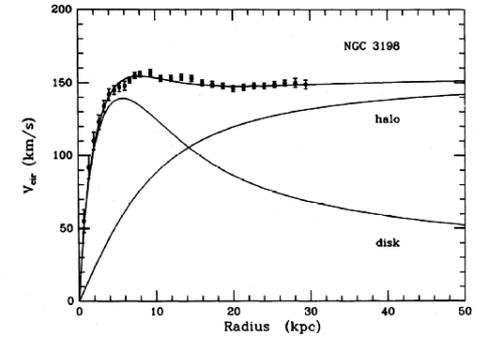
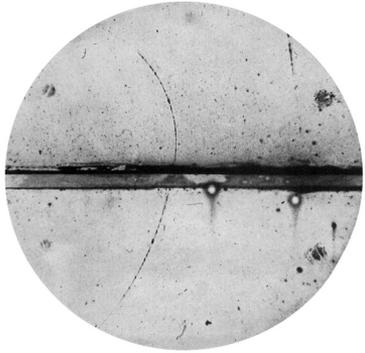
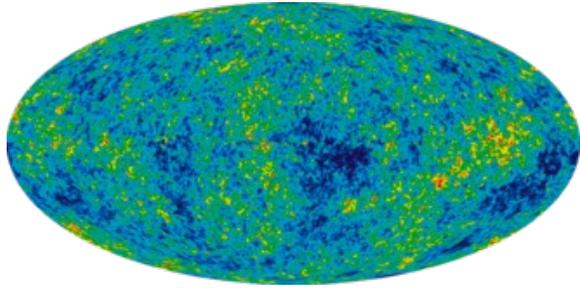
**Funded by
the European Union**

It is possible to learn something fundamental from astrophysical data.

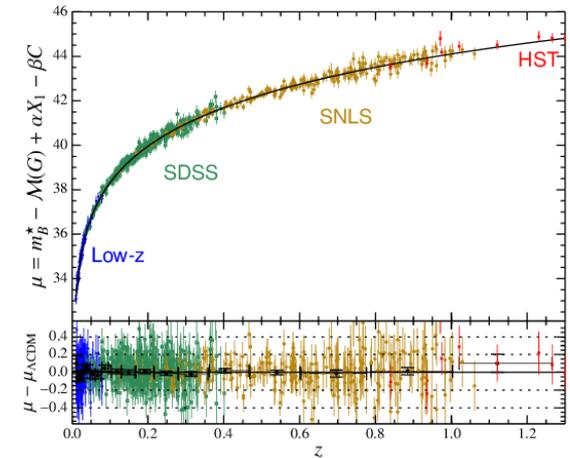
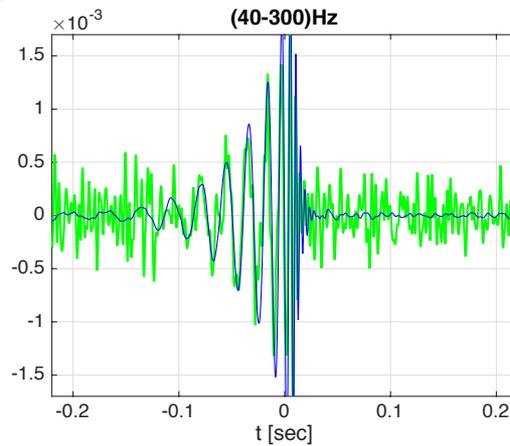
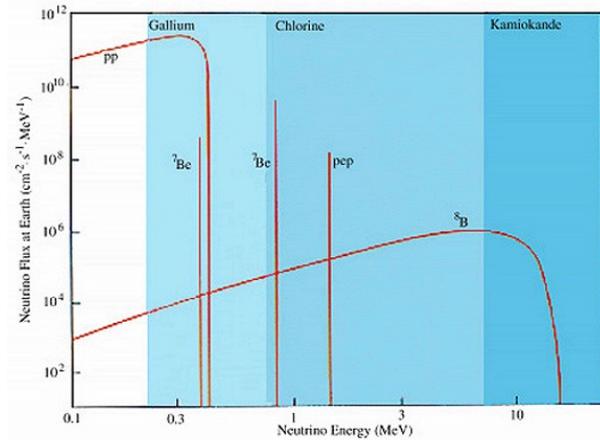
It has happened in the past.



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Galaxy Cluster Abell 2218
NASA, A. Fruchter and the ERO Team (STScI, STECF) • STScI-PRC00-08



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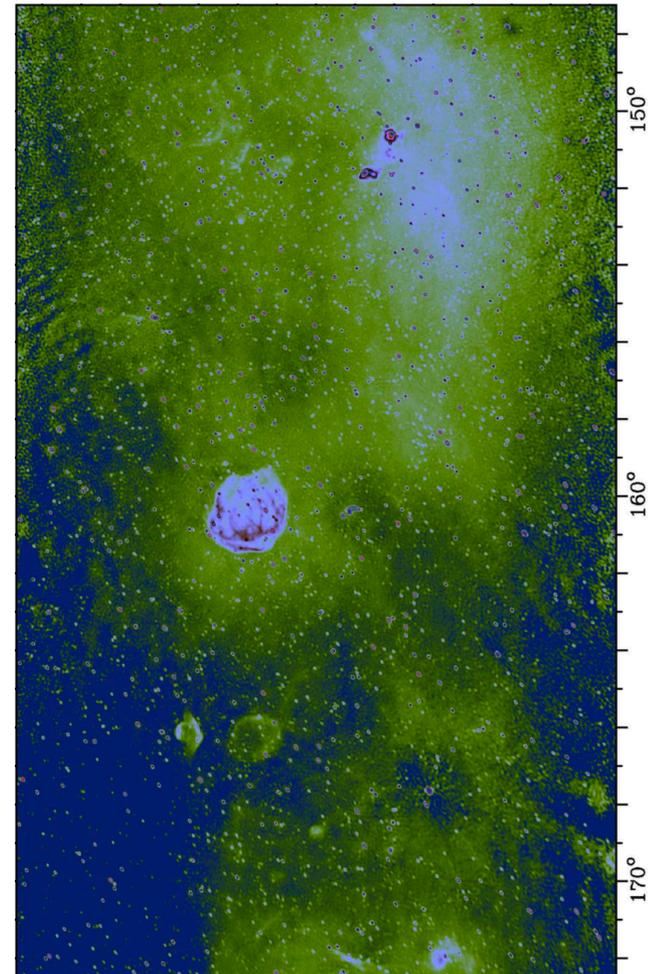
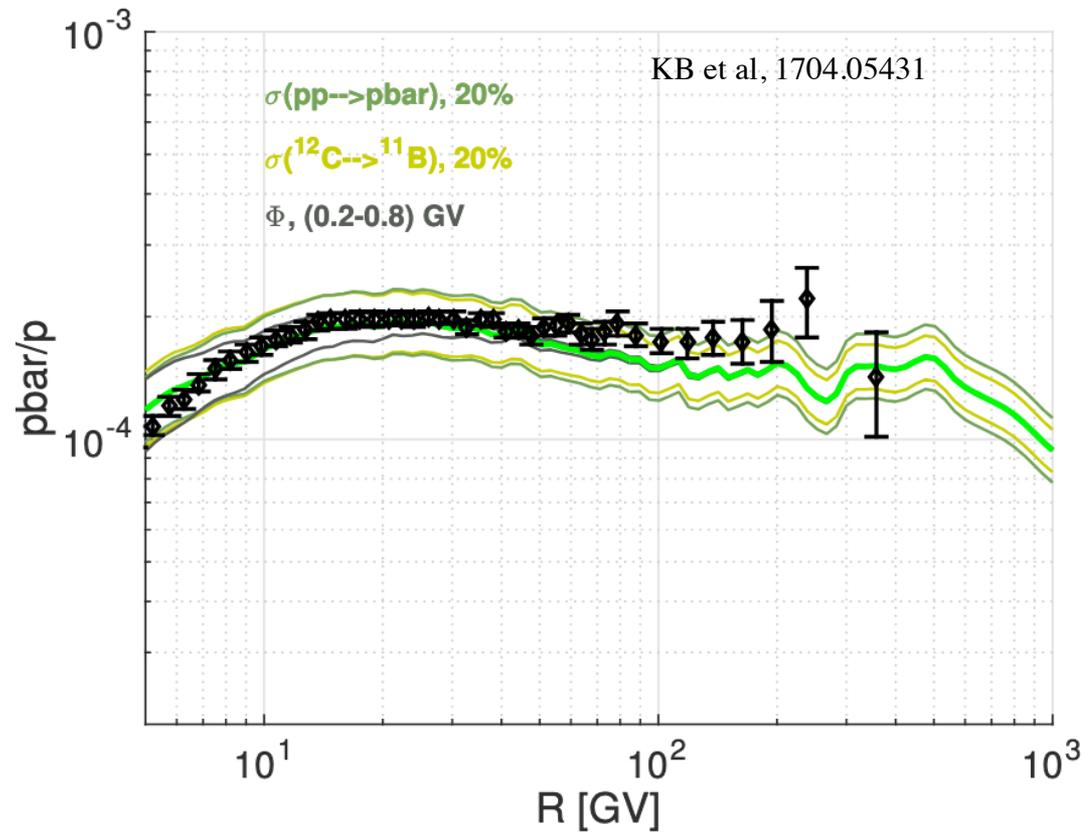
How about this: find a problem, and try to solve it.

Try to understand some astrophysical system — *any* system...

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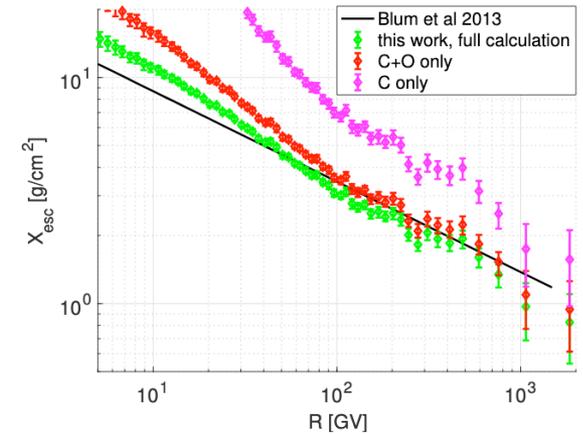
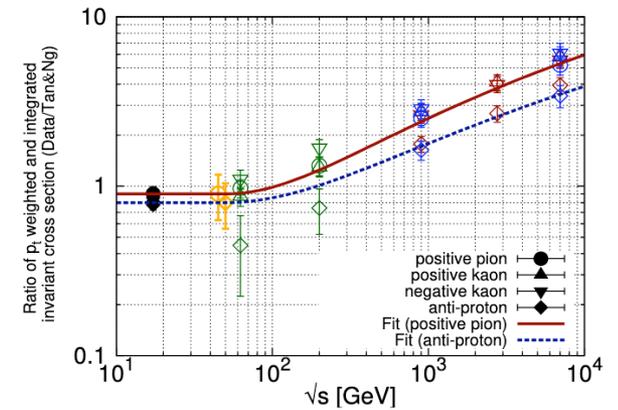
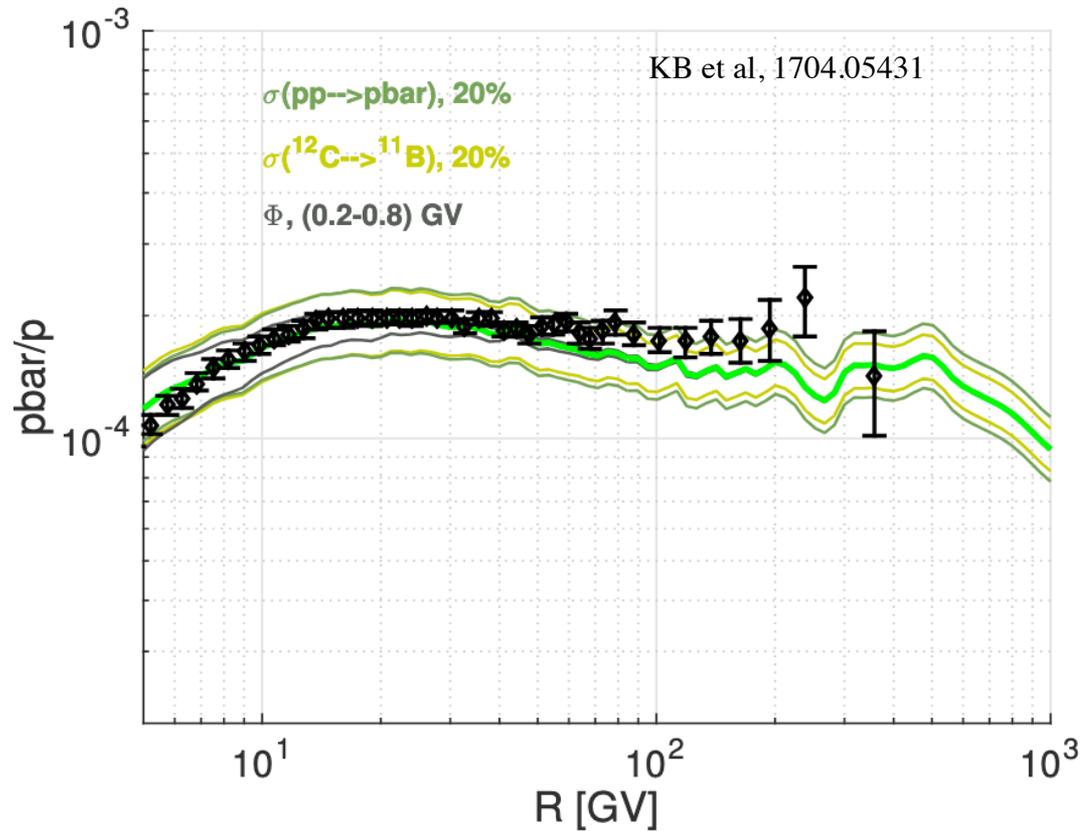


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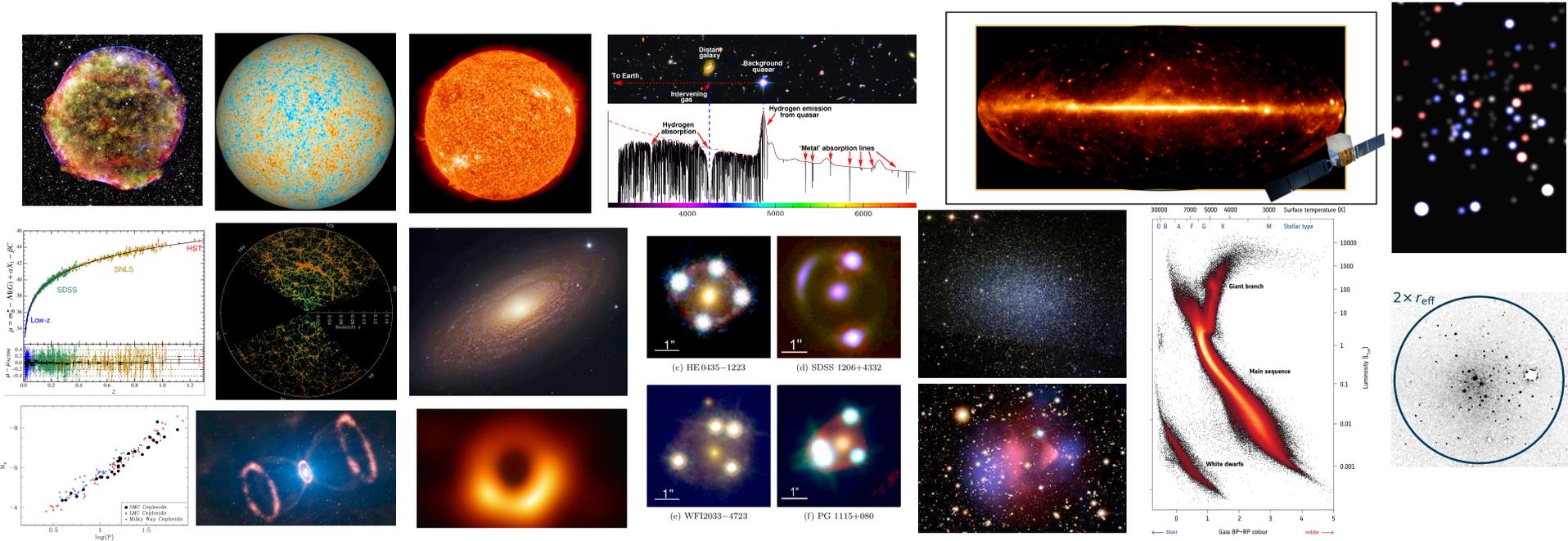
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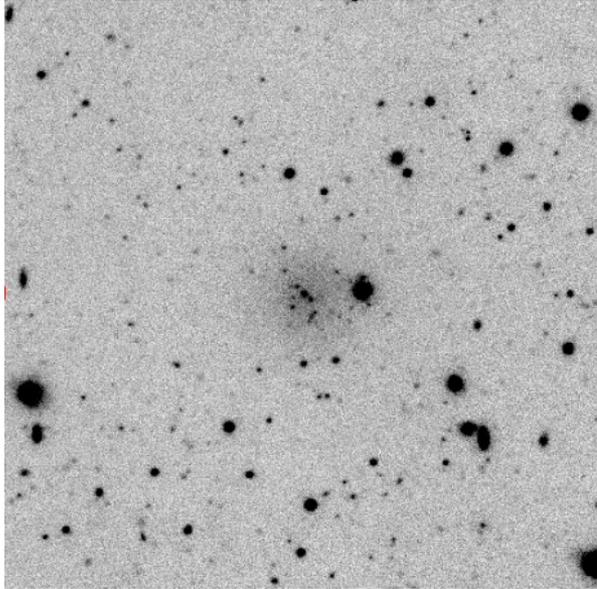
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Globular clusters in dwarf galaxies

NGC5846-UDG1: ultradiffuse galaxy

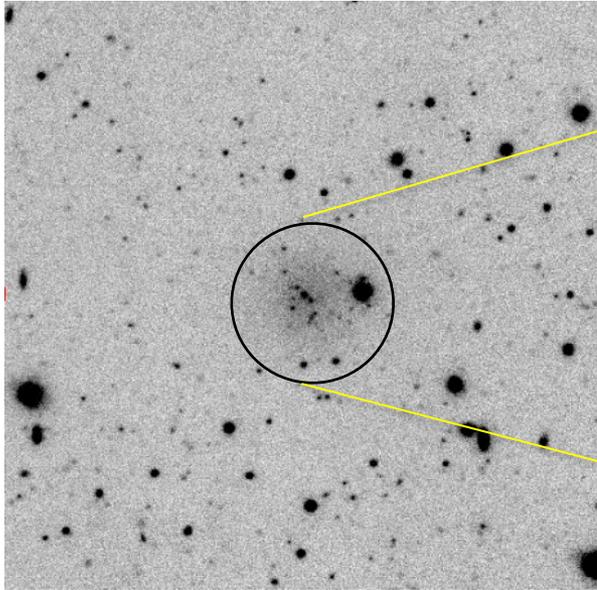


Forbes et al 1905.06415

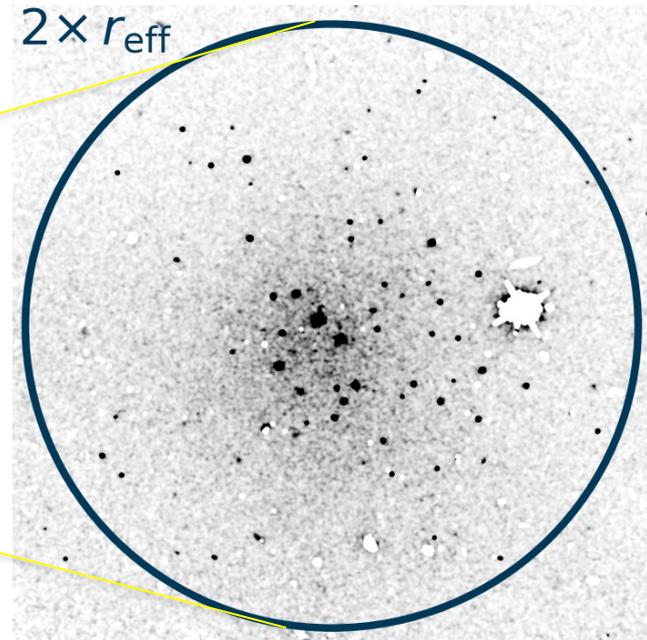
Saifollahi et al 2201.11750 — UDGs and GCs in the Coma cluster

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NGC5846-UDG1: ultradiffuse galaxy



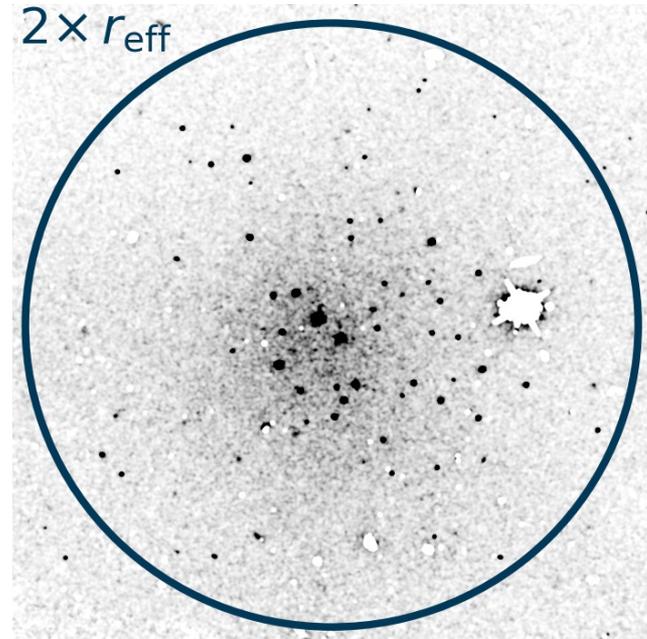
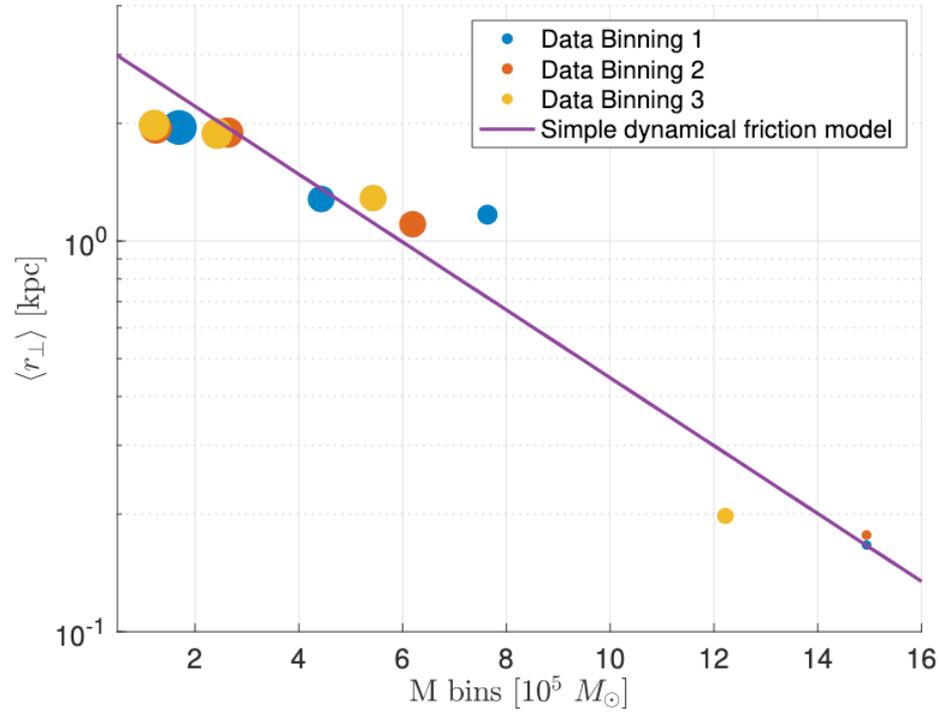
Forbes et al 1905.06415



Bar, Danieli, KB 2202.10179

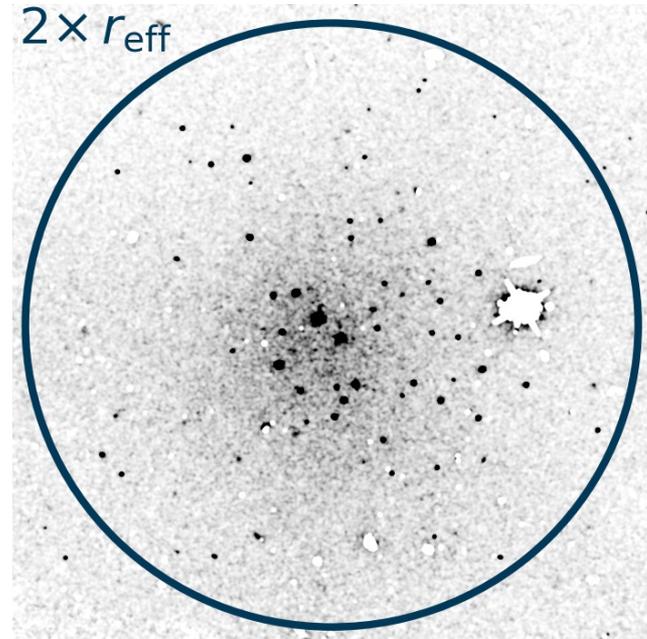
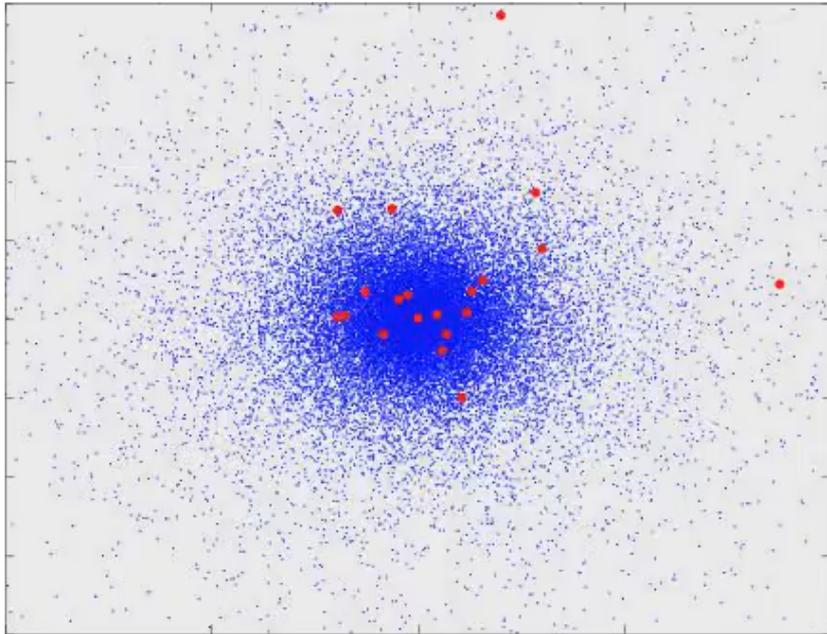
Saifollahi et al 2201.11750 — UDGs and GCs in the Coma cluster

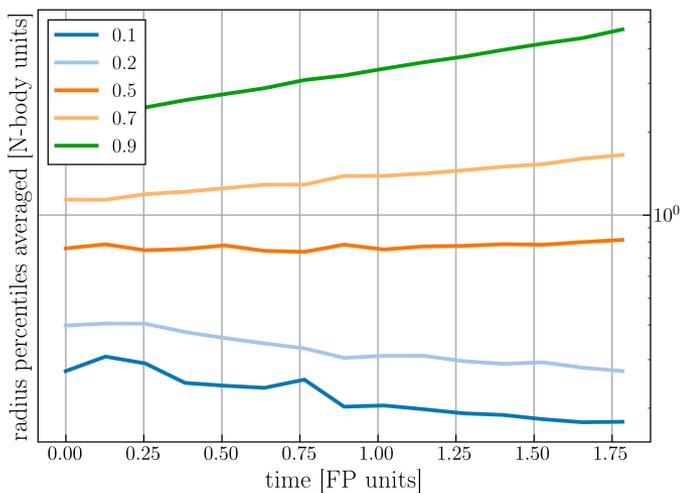
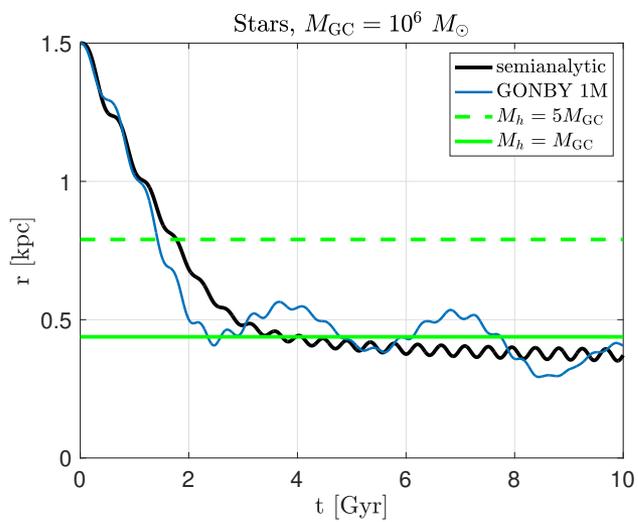
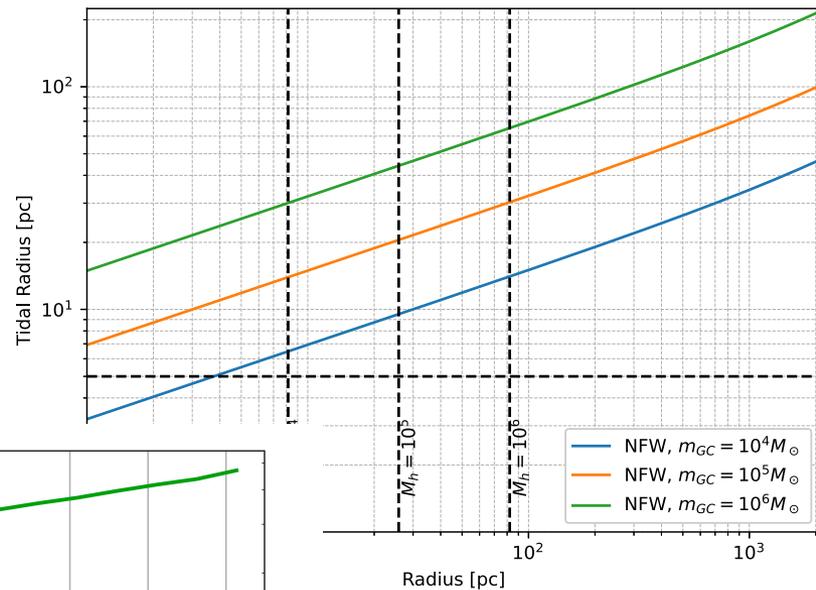
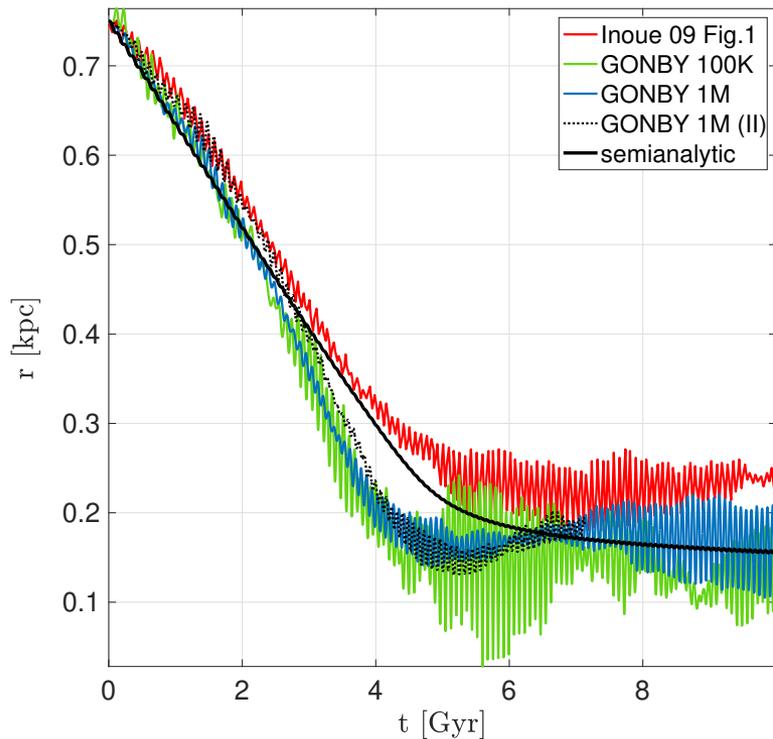
Globular clusters in dwarf galaxies



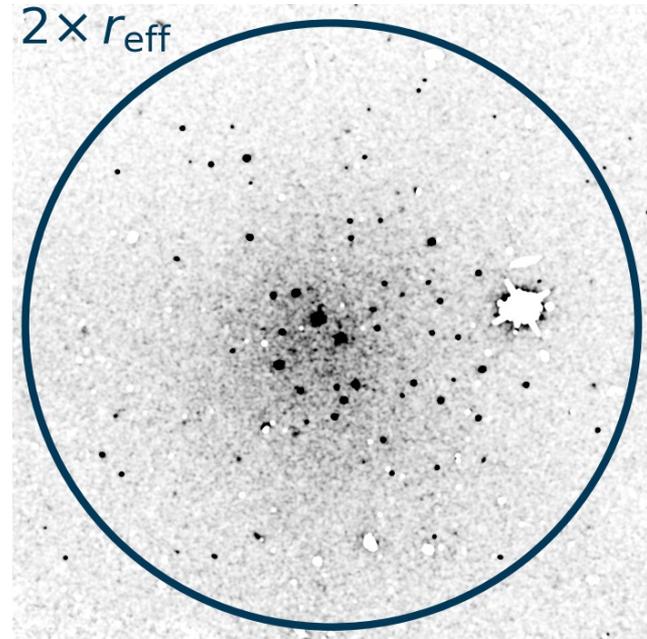
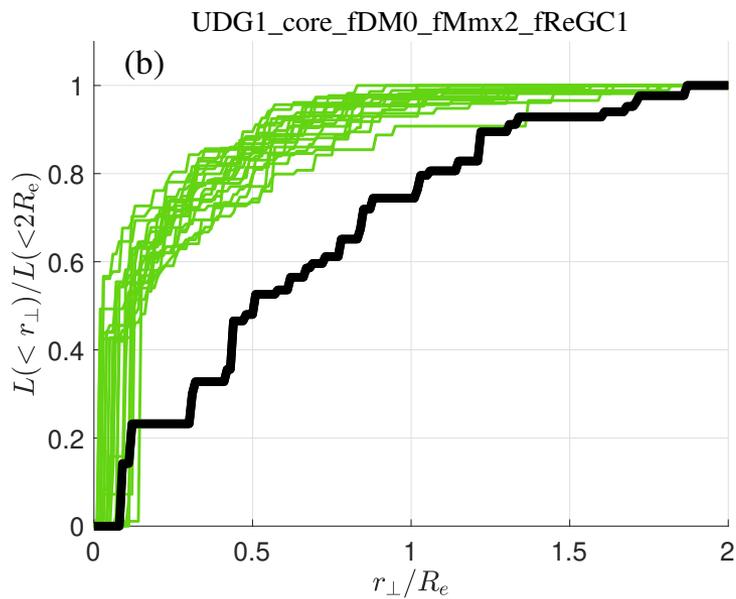
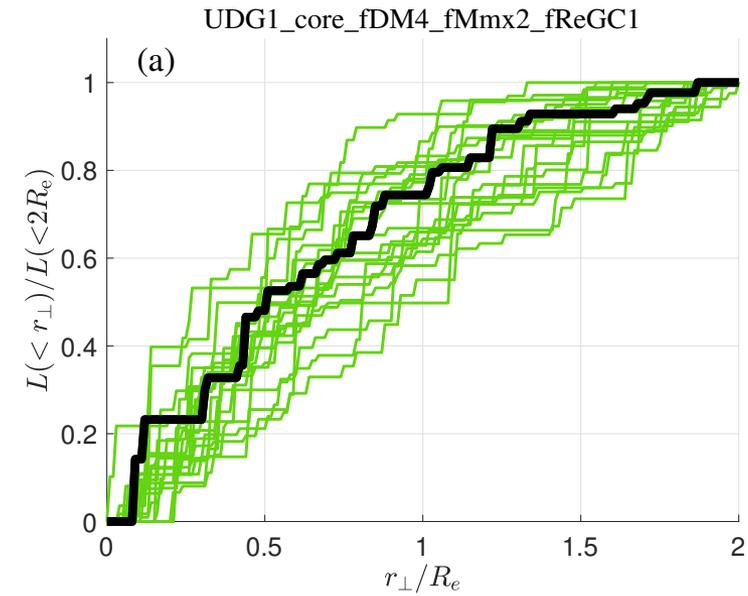
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Globular clusters in dwarf galaxies





Globular clusters in dwarf galaxies



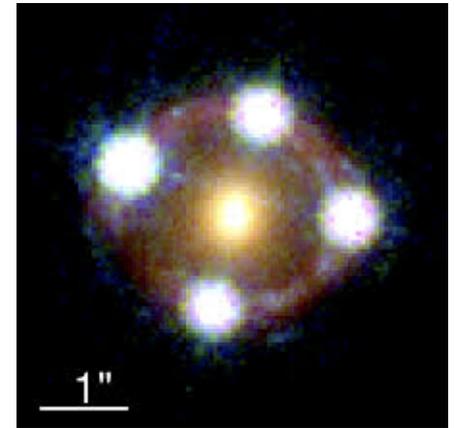
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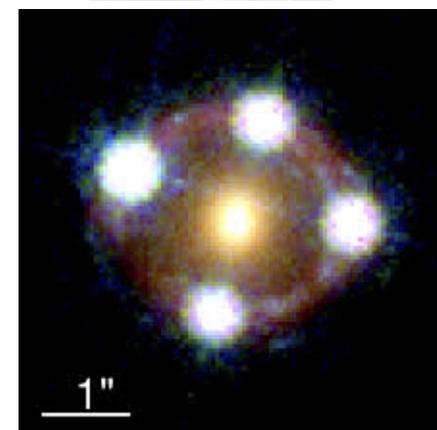
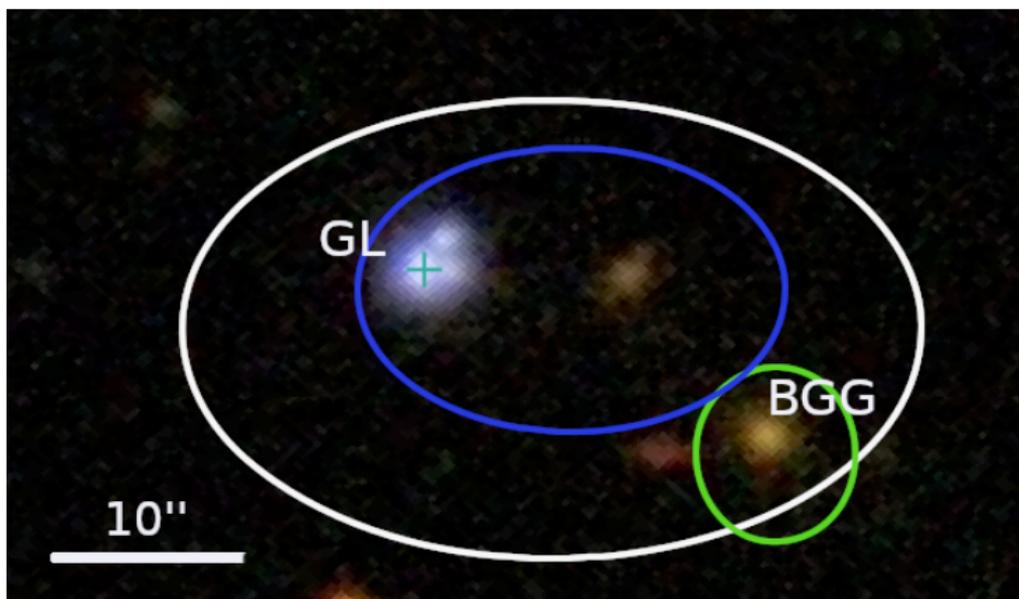
Gravitational lensing: quasar lensing time-delay



Strong gravitational lensing

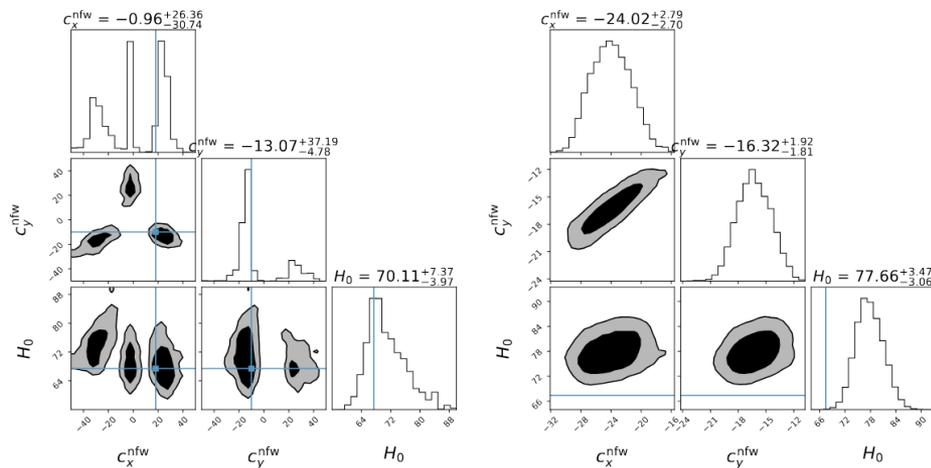
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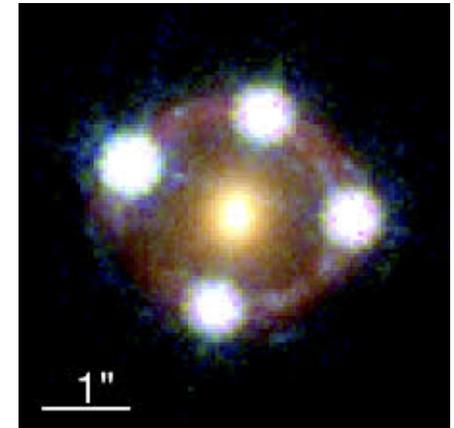
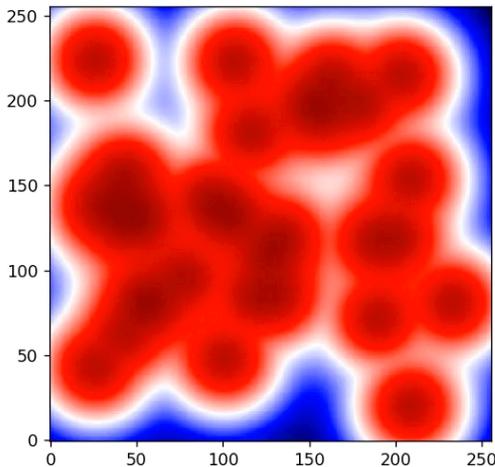
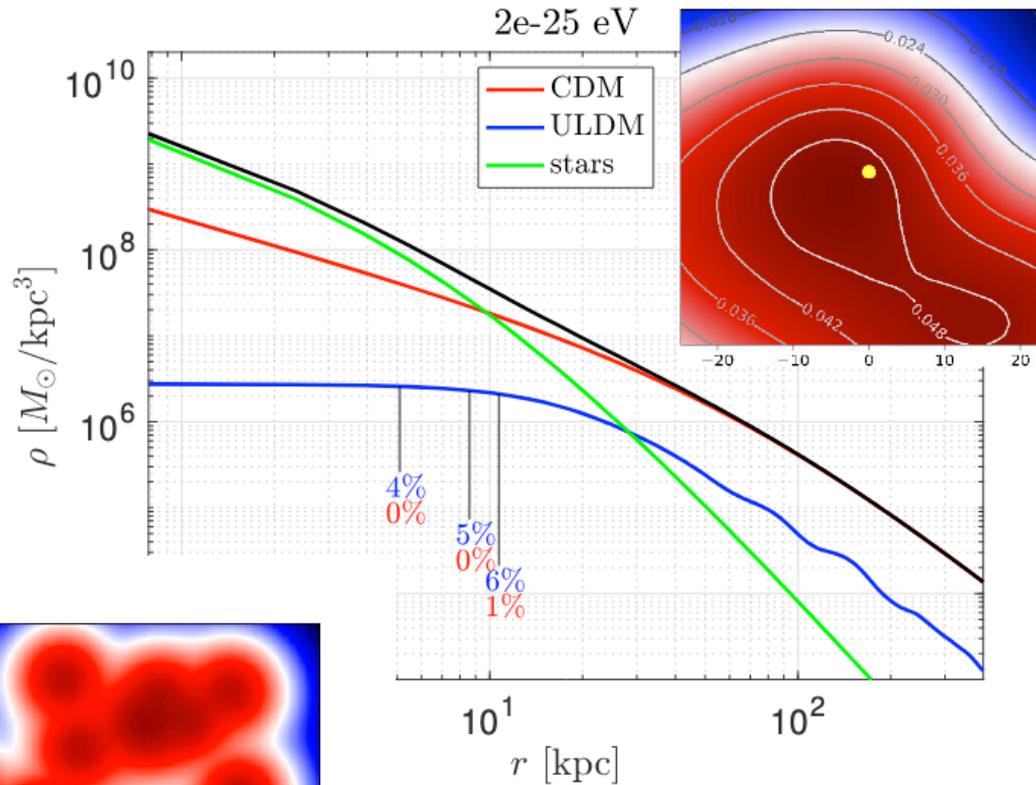
Strong gravitational lensing

2001.07182, 2105.10873,
2201.05111, 2305.19151,
2409.04134



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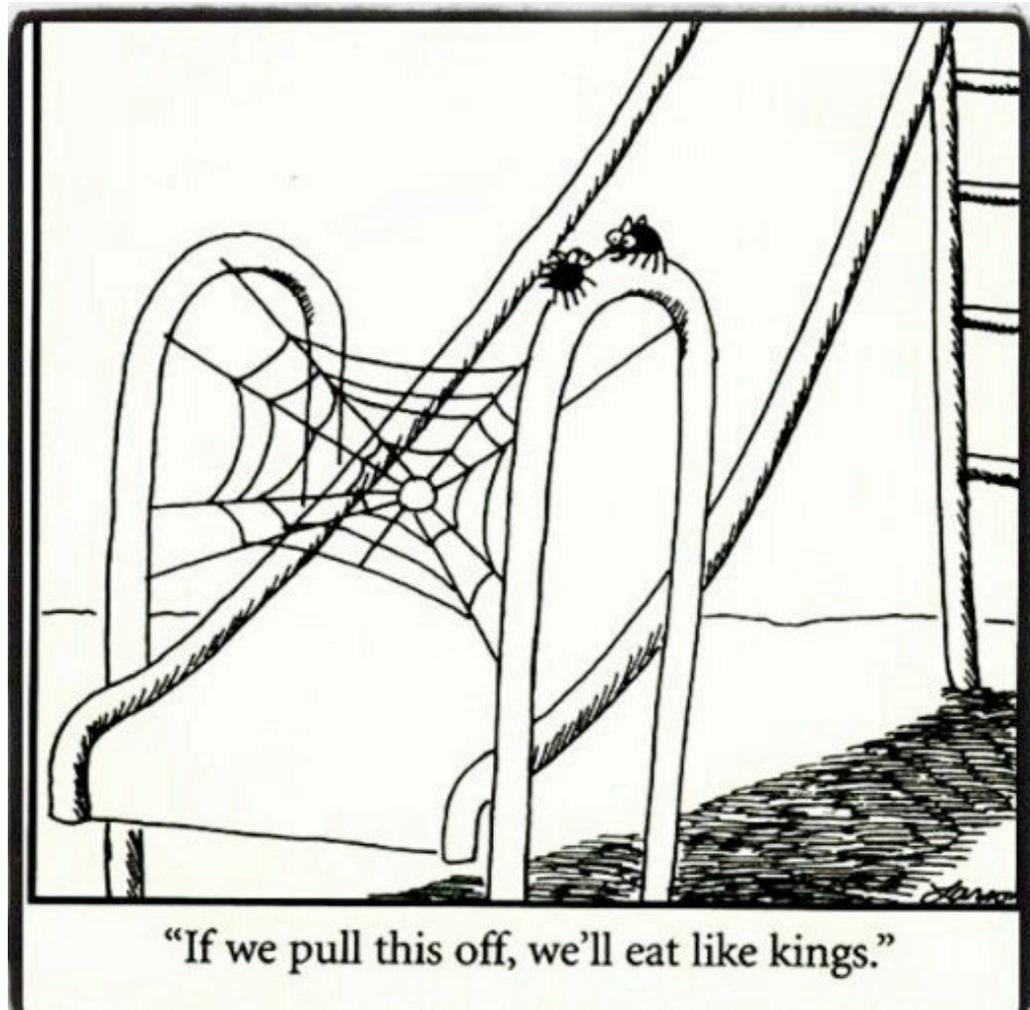
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2001.07182, 2105.10873,
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Thanks!

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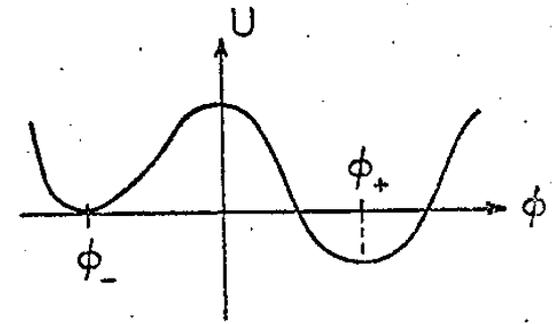
False vacuum decay

Basic questions about cosmological phase transitions.

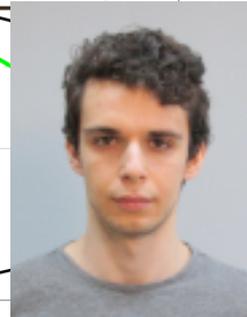
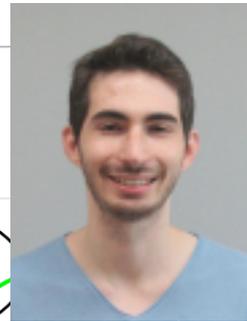
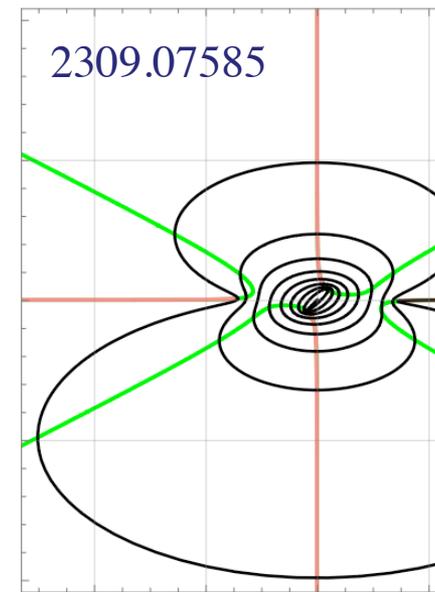
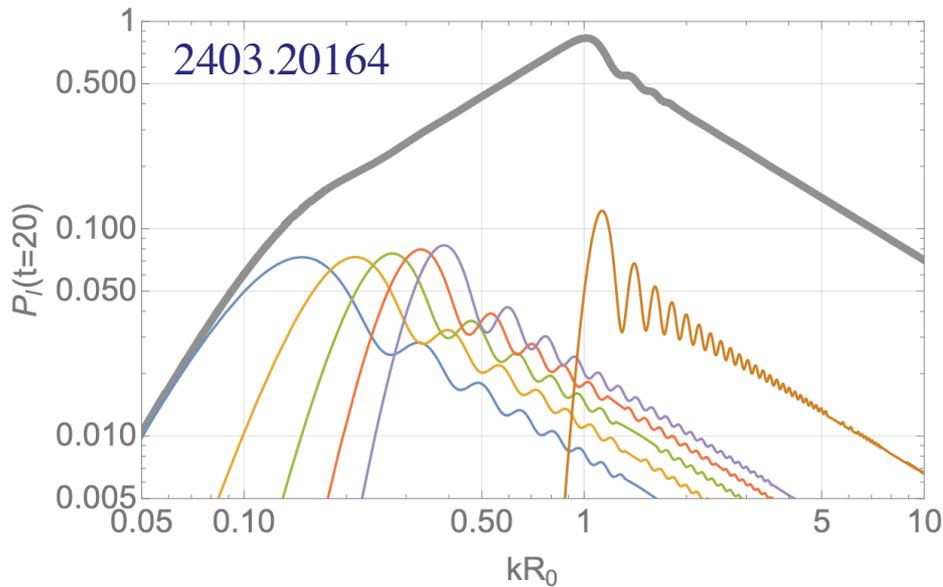
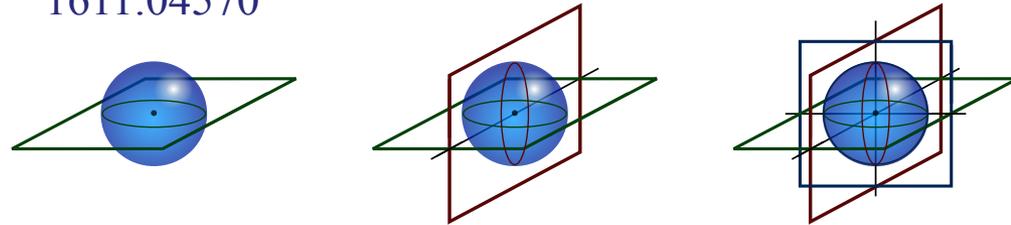
Real-time perspective on dynamics.

Does bubble nucleation produce gravitational waves?

S. Coleman '77
Fate of the False Vacuum



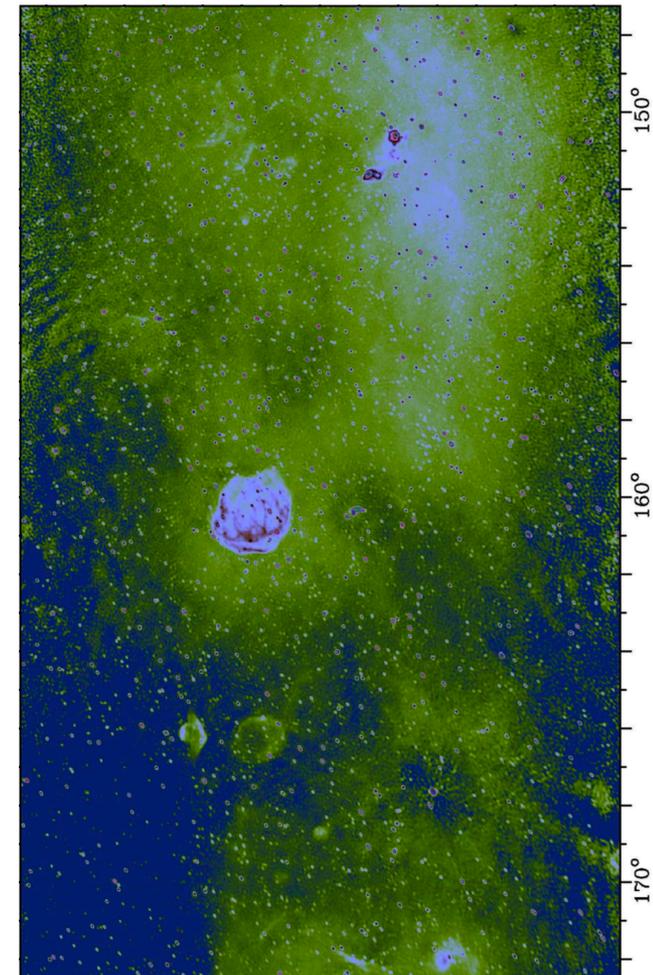
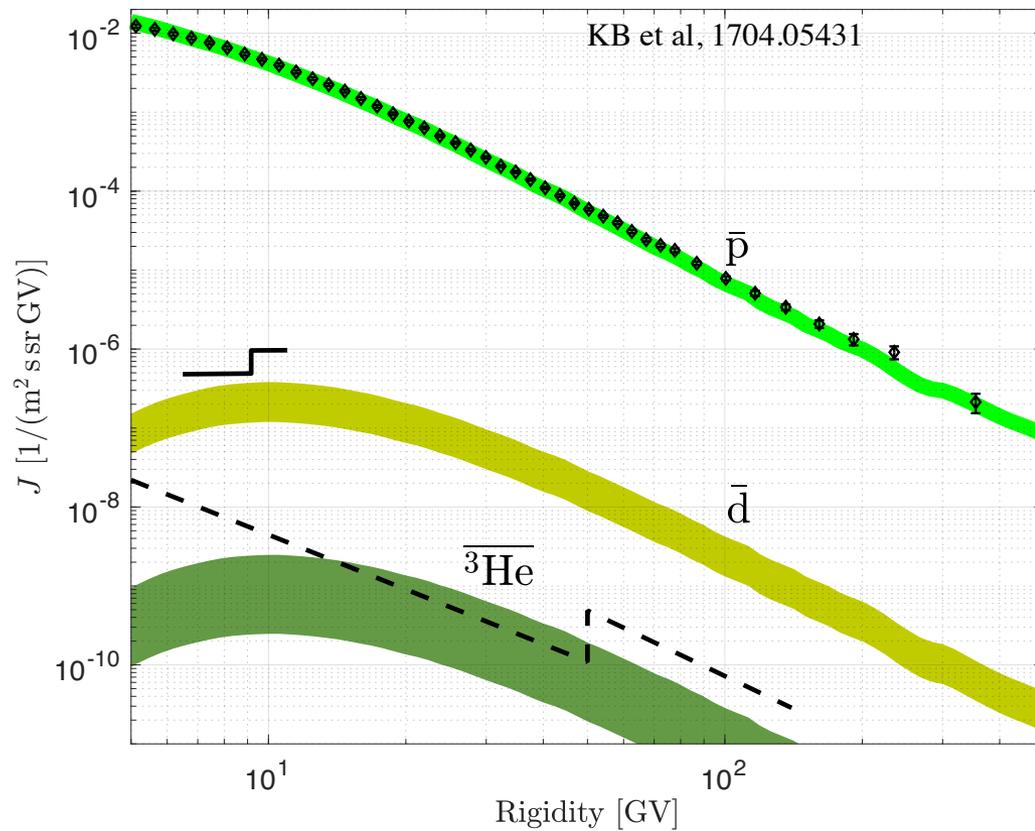
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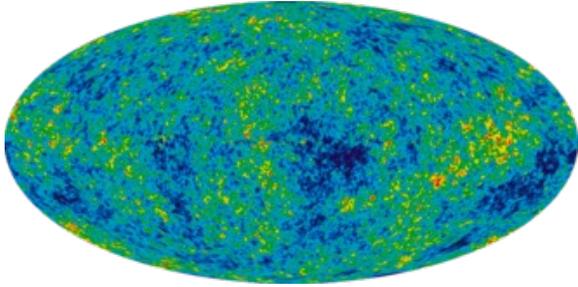
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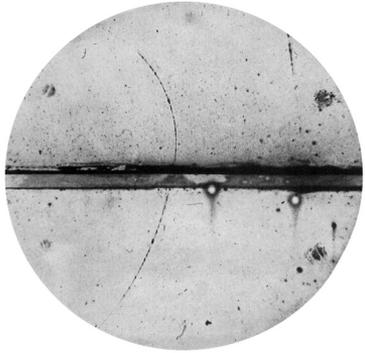
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Expansion, initial conditions



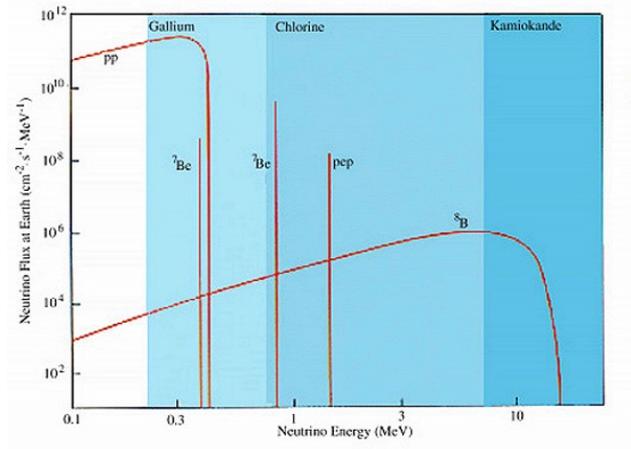
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QFT works



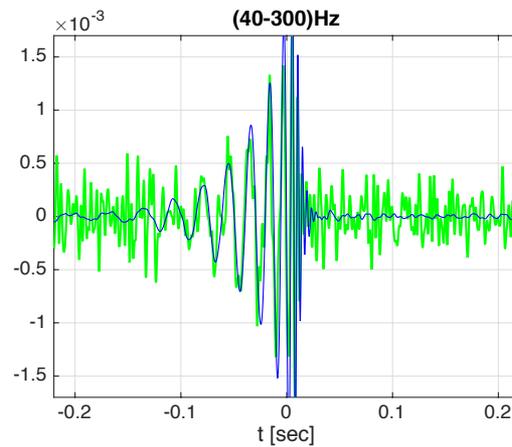
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The Standard Model is wrong



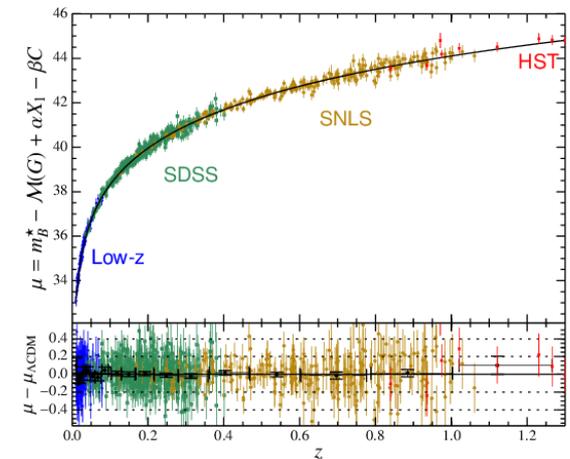
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GR works



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Vacuum energy



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Baryonic matter is not enough

