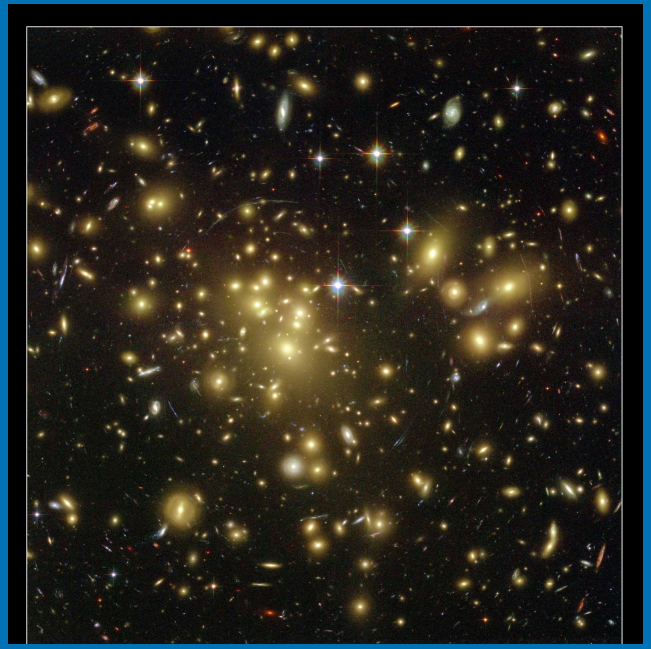
Environmental effects in the most dense environments: Clusters of galaxies:



Mass ~1e14-1e15 Msol

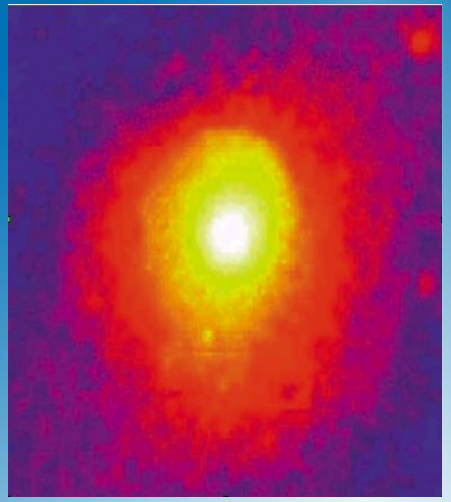
Ngal ~1000-2000

Vel-dispersion~1000 km/s

Intracluster-medium:

Assuming hydrostatic equilibrium:

$k_B T \sim \frac{1}{2} m_p V^2$



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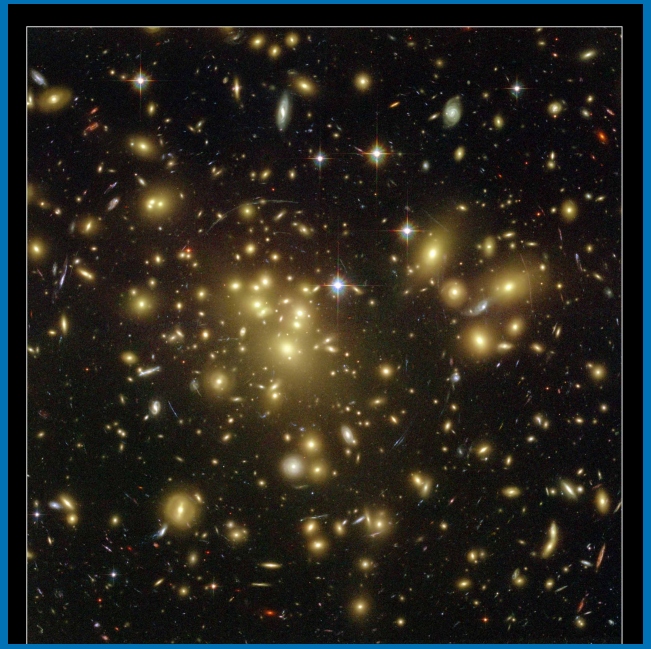

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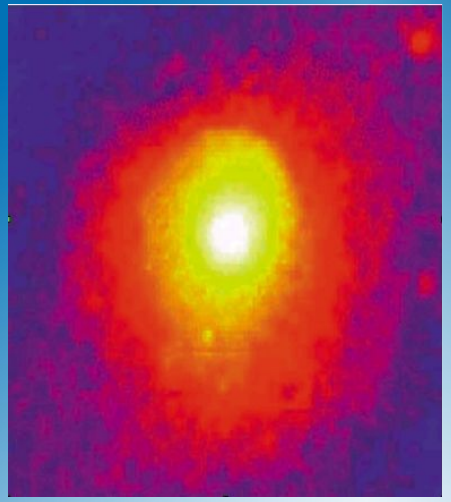

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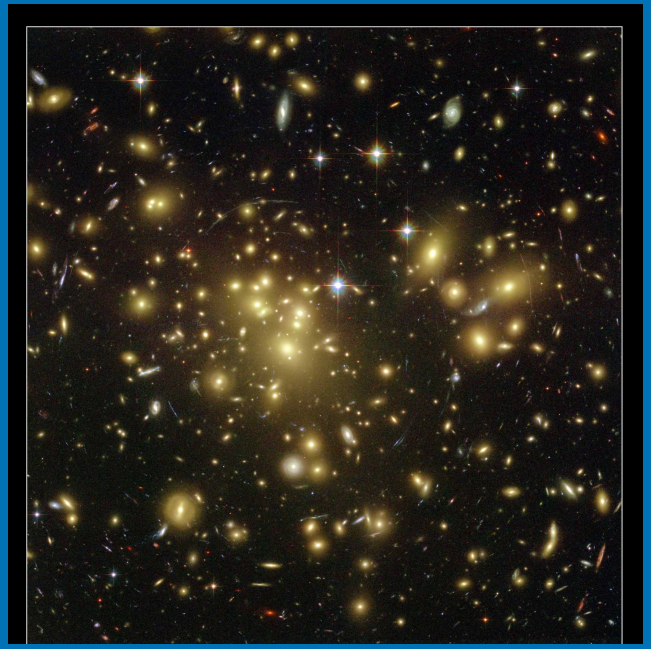

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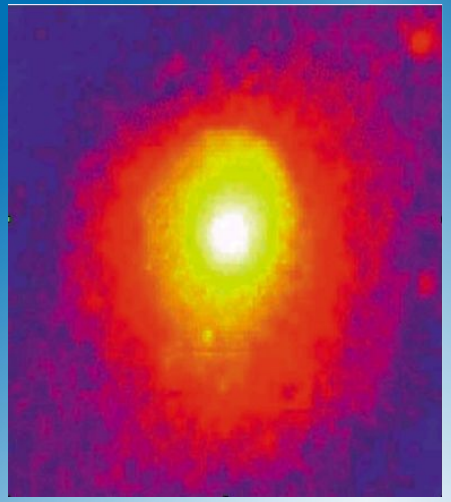
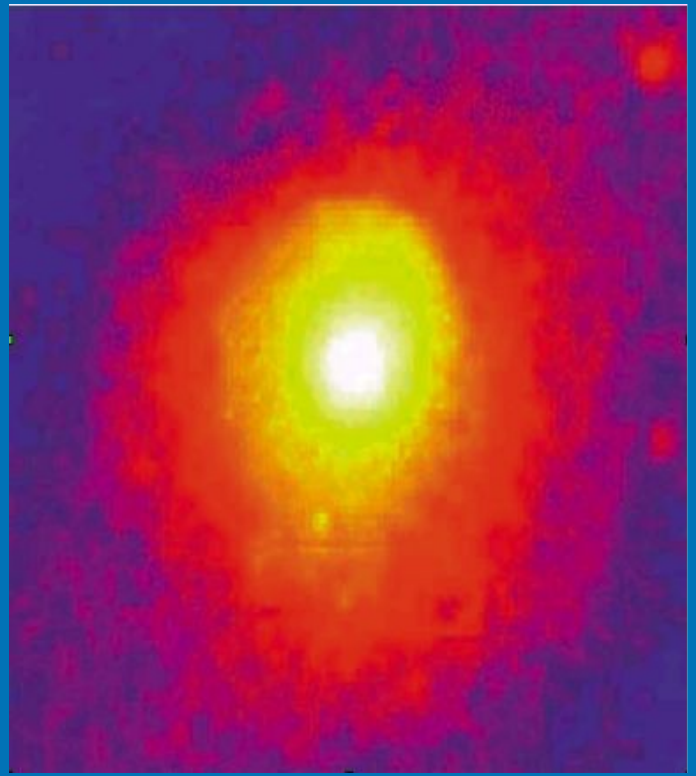


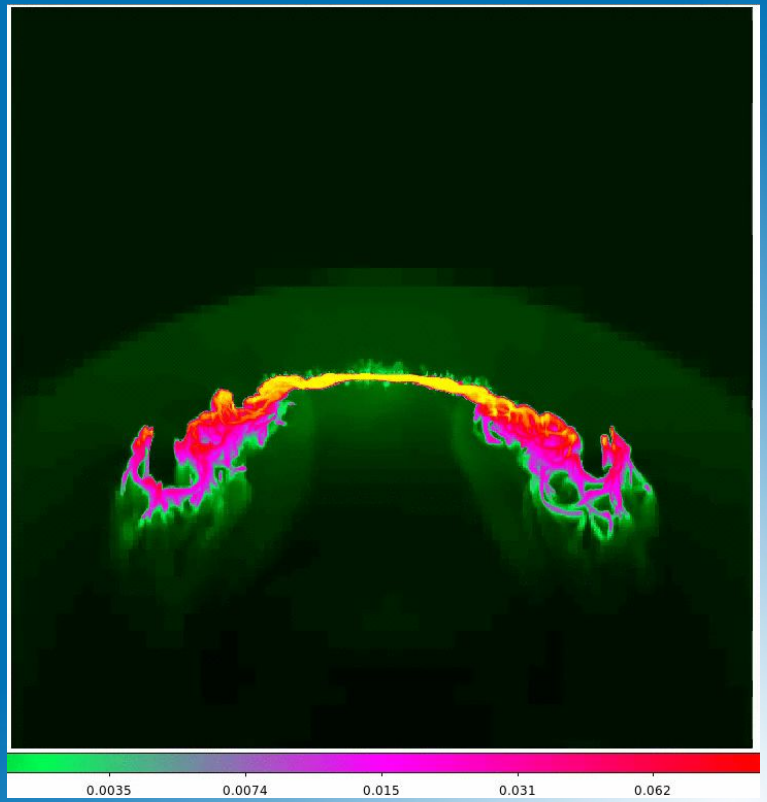
Beta profile: $\rho = \rho(0)(1 + r^2/r_c^2)^{-3\beta/2}$

Virgo cluster: beta=0.5, rc=50 kpc
rho0=2e-26 g/cc

The Intra-Cluster Medium



Virgo cluster in X-rays, ROSAT



Simulation of a galaxy disk undergoing RPS

The motion of a galaxy through the intra-cluster medium causes a drag force on it's HI gas disk

Outside-in stripping of gas

gas (grey cloudy)
Stars (white)

…but stars unaffected!

Outside-in stripping of gas

Some basic theory:

For exponential gas and stellar disk: $\Sigma(R) = \Sigma_0 \exp(R/R_\mathrm{d})$

stellar disk

Outside-in stripping of gas

Some basic theory:

For exponential gas and stellar disk: $\Sigma(R) = \Sigma_0 \exp(R/R_{\rm d})$

stellar disk + thin gas disk

Outside-in stripping of gas

Some basic theory:

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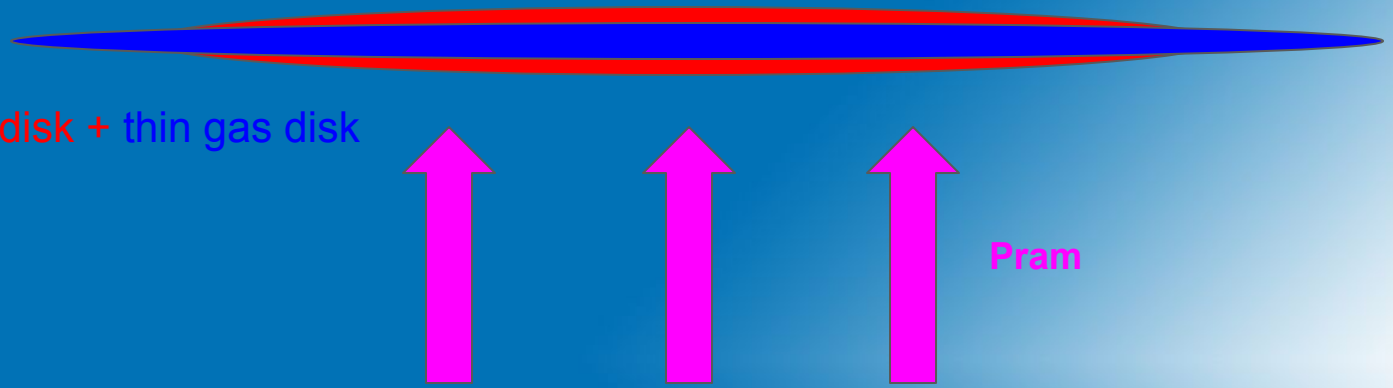
Ram pressure: $P_\mathrm{ram} = \rho_\mathrm{ICM} v^2$



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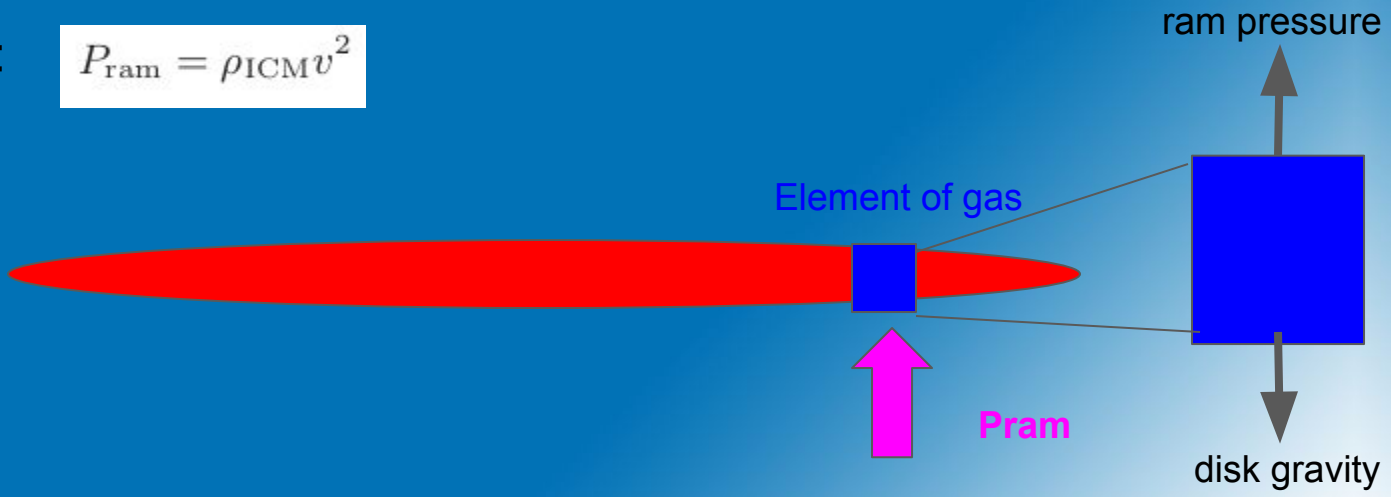

ram pressure vs self-gravity of disk

Outside-in stripping of gas

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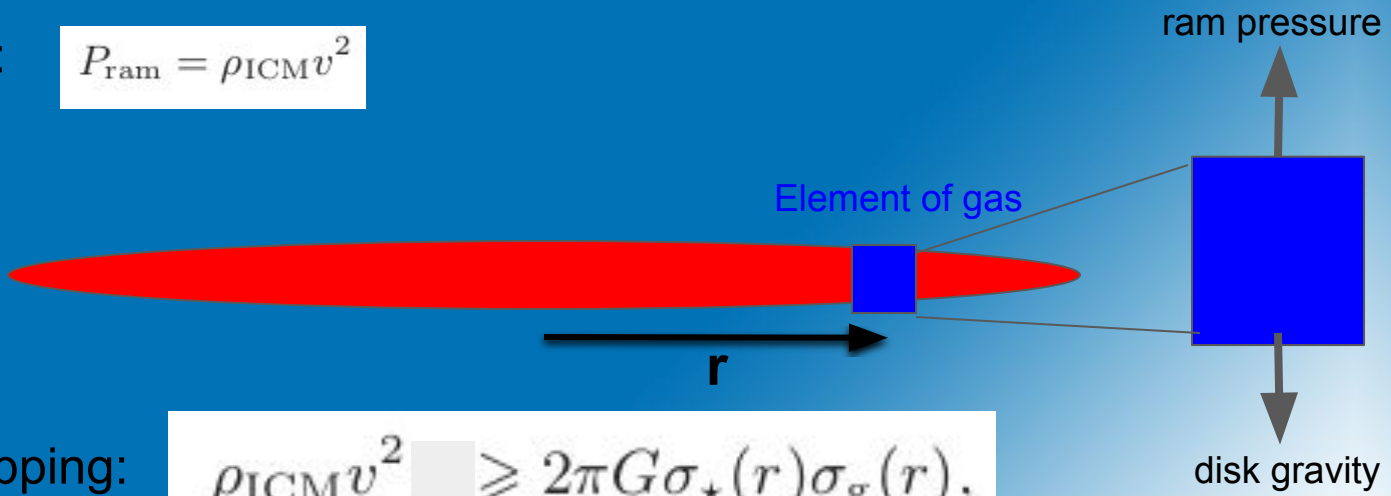
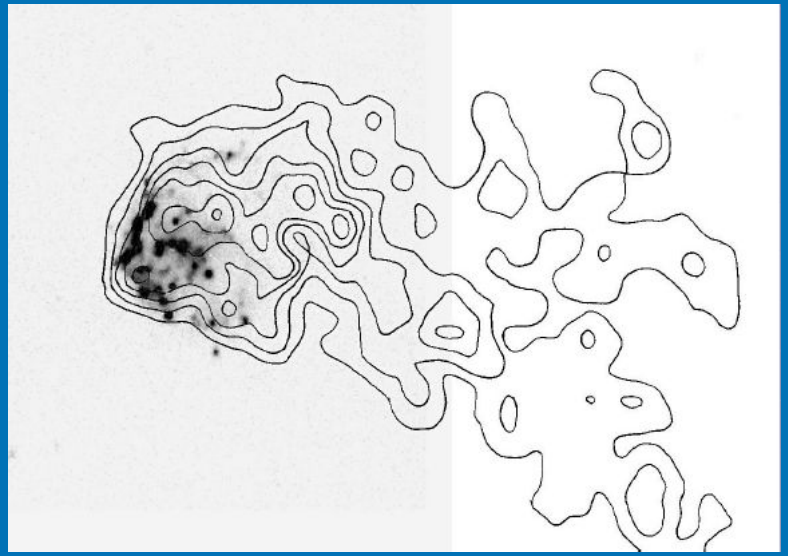


Condition for stripping: $\rho_\mathrm{ICM} v^2 \geqslant 2\pi G \sigma_\star(r) \sigma_\mathrm{g}(r),$

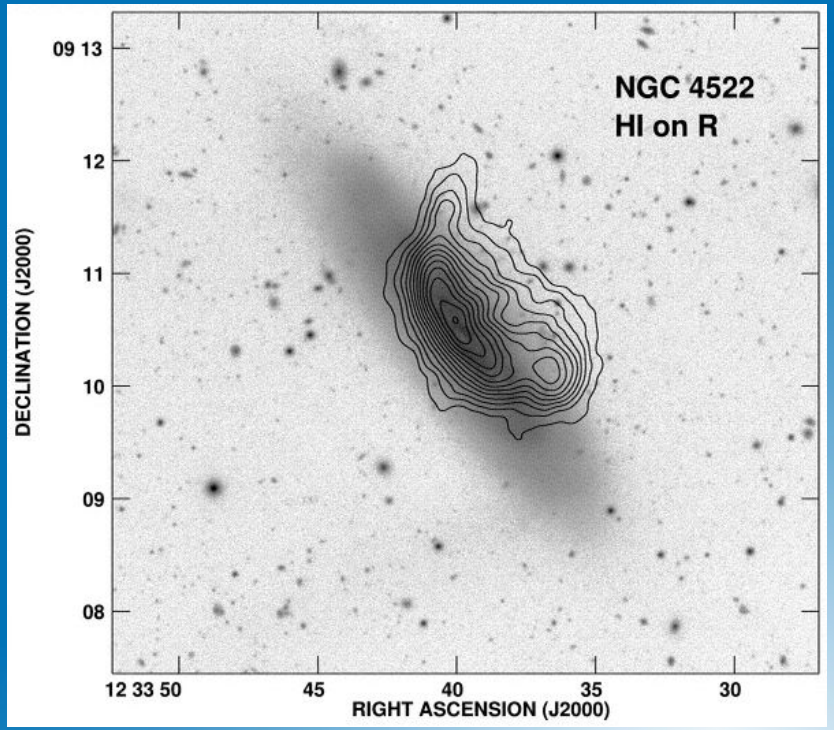
ram pressure vs self-gravity of disk

Observable consequences (gas):

Gas asymmetry/tails:

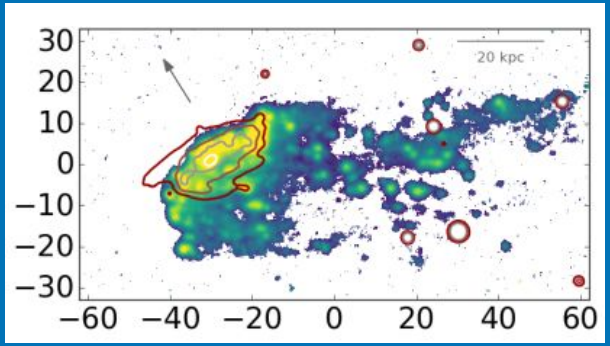


CGCG 97079 – Radio continuum and Hα, Boselli & Gavazzi, 2006



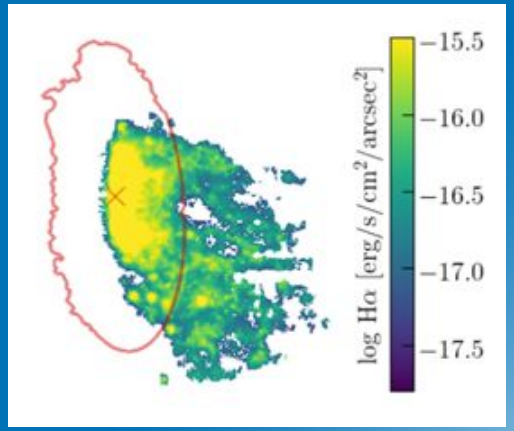
Kenney, 2004, **note no effect on stellar disk!**

Extra-galactic Star Formation in RPS galaxies:

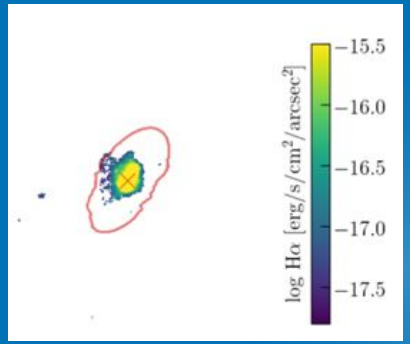


MUSE H-alpha map of Jellyfish galaxy

Poggianti+16



So-called ‘Jellyfish’ galaxies



A Jellyfish galaxies after the tail has gone