We've discussed dark matter in previous lectures. To give context to today's discussion, here is a very brief overview of MOND:

MOND posits that, rather than invoking unseen dark matter to explain observed mass discrepancies, we change the force law at a critical acceleration scale, $a_0 \approx 10^{-10}\ \mathrm{m\,s^{-1}}$. At high accelerations, everything is normal:

$$a = g_N \text{ for } a \gg a_0$$

where g_N is the force per unit mass computed in the usual way form the Poisson equation. (For a point mass M, $g_N = GM/r^2$.) Things only change below the critical acceleration scale such that

$$a = \sqrt{g_N a_0} \text{ for } a \ll a_0.$$

The two regimes are connected by an arbitrary smooth interpolation function $\mu(a/a_0)$. For more details, see www.astro.umd.edu/~ssm/mond/.

Our discussion identified the following pros and cons of dark matter and MOND:

Table 1. Pros and Cons of Dark Matter and MOND

Dark Matter		MOND	
pros	cons	pros	cons
CMB	can't see it	only tweaking known force	rich clusters
mergers	moving target	rotation curves	large scale structure
rich clusters	fine tuning	Tully-Fisher	CMB
gravitational lensing	No MOND phenomena	predicted LSB dynamics	dwarf spheroidals
GR preserved	not seen in solar system		Why does it happen?
	new particles		conservation laws
	complicated		