

# Rotation Curves of Dwarf Irregulars: Still a Big Challenge for $\Lambda$ CDM

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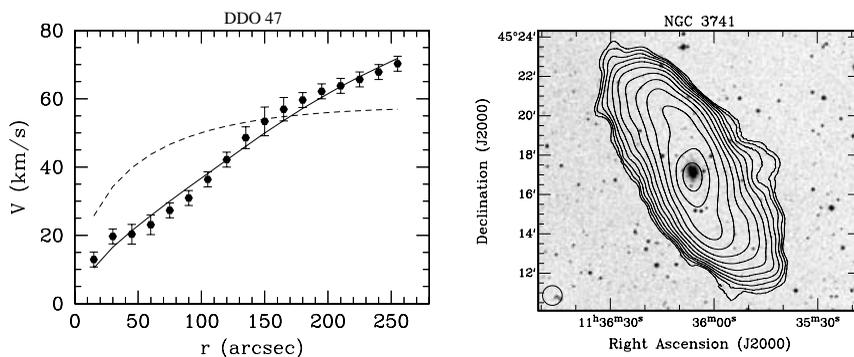
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**Abstract.** I present the analysis of HI data of two nearby dwarf irregular galaxies: DDO 47 and NGC 3741, whose rotation curves are best fitted by a cored halo, while they are inconsistent with an NFW halo. In DDO 47 non-circular motions are too small to explain the discrepancy with the  $\Lambda$ CDM predictions. NGC 3741 has the most extended rotation curve ever observed, in terms of the optical size.

$\Lambda$ CDM simulations predict dark matter halo profiles (e.g. Navarro, Frenk & White 1997, NFW) which are too “cuspy” to be in agreement with the observed rotation curves of disk galaxies. A possible solution would be that non-circular motions induced by the triaxiality of the halo might hide the cusp. Two test-cases are shown here.

I show HI observations of 2 dwarf irregular galaxies: DDO 47 and NGC 3741. The kinematics of DDO 47 is best fitted by a cored halo (Fig. 1, left panel) and it is inconsistent with an NFW halo; non-circular motions are far too small to explain the discrepancy with the LambdaCDM predictions (Gentile *et al.* 2005).

NGC 3741 has the most extended rotation curve ever measured, in terms the optical disk: the HI disk extends out to 42 exponential scale lengths (Fig. 1, right panel). Modelling of the data cube shows that non-circular motions at a level of  $\sim 5 - 10 \text{ km s}^{-1}$  are present. The rotation curve is best-fitted by a cored halo; MOND also fits well. The NFW halo fails to reproduce the observations (Gentile *et al.* 2006, in prep.).



**Figure 1.** Left: mass models of DDO 47. Solid line: fit with a cored halo; dashed line: fit with an NFW halo. Right: optical (greyscale) image of NGC 3741 overlaid with total HI contours.

## References

- Gentile, G., Burkert, A., Salucci, P., Klein, U., & Walter, F. 2005, ApJ, 634, L145.  
Navarro, J. F., Frenk, C. S., & White, S. D. M., 1997, ApJ, 490, 493.