



***Junction of a Hyperbolic Space
to the Λ CDM Universe***

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In past AAS mtgs we presented data supporting a hyperbolic-space model of dark matter (as a perfect fluid) including - examples:

- a) Formula describing the “scaffold” structure of all Hubble spiral galaxies (MNRAS 397, 164 (2009)).**
- b) Excellent galaxy Rotation Curve fits**

All derived from the usual Einstein equations.

We now ask the question: What happens when we join our hyperbolic space to the flat space of the Λ CDM Universe?

Conditions for Israel-Darmois Junction:

- **Interior is a neg curved 3-space in a FRW 4-space (with matter --- fluid eqn of state: $p = -1/3 \rho$)**
- **Exterior is a flat 3-space in a FRW 4-space**
- **Two 4D metrics must be joined**
- **Two “extrinsic curvature tensors” must be joined**

Consequences of the Junction

2 major results

- Interior space (galaxy halo) is expanding but decelerating
- Residual matter is laid down at the expanding junction to create a relic mass density that precisely matches the dark matter Burkert Profile.

Junction solution

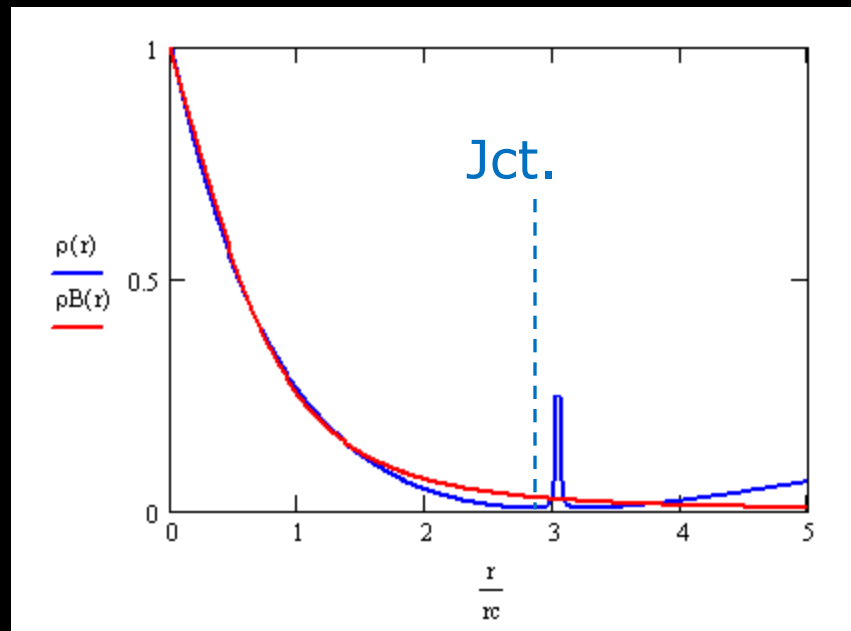
Interior matter density

- Matches Burkert profile of dark matter
- Permits central density = $100 \rho_c$
- Permits Junction density = ρ_c

$$\rho_B(r) \equiv \frac{\rho_{cent}}{\left(1 + \frac{r}{r_c}\right) \left(1 + \left(\frac{r}{r_c}\right)^2\right)}$$

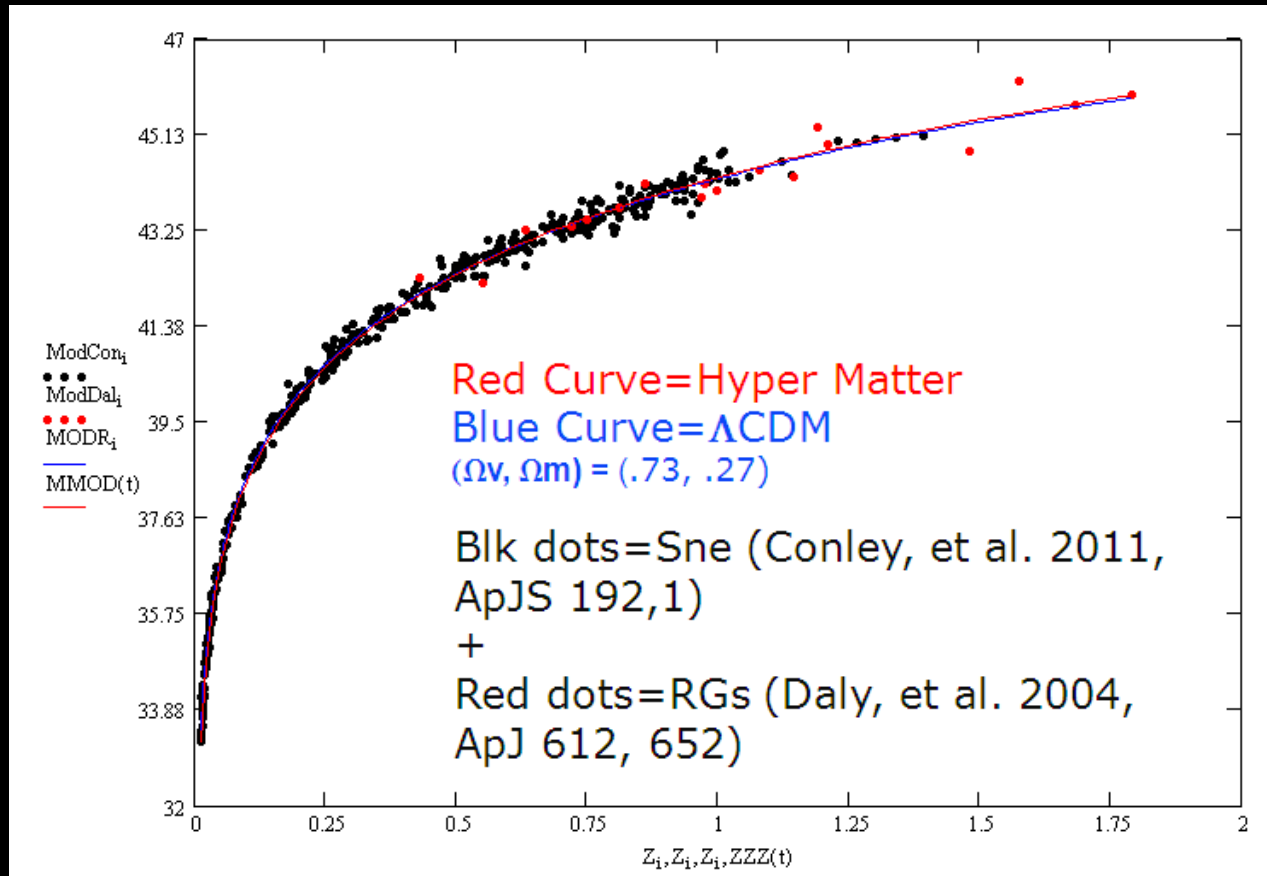
Burkert - red

Jct. soln - blue



The Cosmological Fit of the Hyperbolic Perfect Fluid Model (eqn. Of state: $p = -1/3 \rho$)

Modulus vs. Redshift



Summary

Hyperbolic Model of Dark Matter

- Junction of Λ CDM Universe & hyper-model
- Results: **predictions**
 - 1) Decelerating expansion of typical galaxy halo at $\sim 1-5$ m/s/kPc
 - 2) Interior matter density essentially Burkert dark matter profile, but faster decline between 2-3 scale radii

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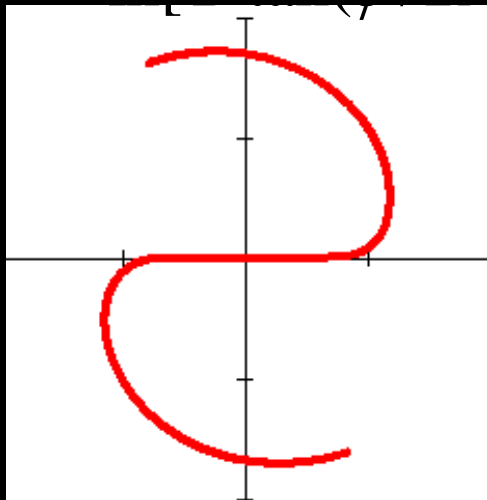
e-mail: ringerha@ge.com

cell: 518-369-0340

NGC 1365 Barred Spiral



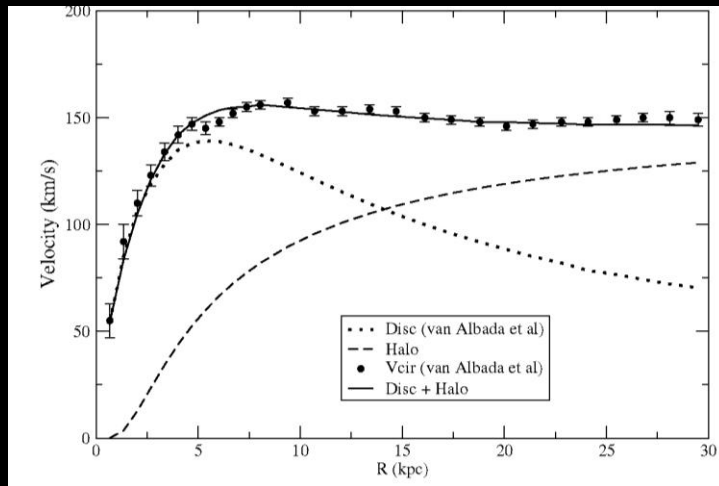
$$r(\phi) = \frac{A}{\ln[B \tan(\phi / 2N)]}$$



MNRAS 397, 164 (2009)



NGC 3198 Rotation Curve (RC) Fit (Disk + Halo)



Universal RC Fits (Disk + Halo)

