

I chose to interrupt our regularly scheduled programming with this paper in order to better understand the process of selecting and calibrating a phenomenological model, and because distance calibration serves so vital a role in probing LSS.

In their introduction, the authors are quick to the point. Hydrogen profile width can be used to determine total mass, which in turn relates to intrinsic luminosity. They reference other papers that have argued for similar, more limited correlations, while disregarding papers with more general conclusions; i.e. relations between rotation velocity and type or mass and type. As always, the difficulty in establishing the H profile width/ luminosity relation will be in finding accurate distance measures to calibrate with.

To this end, they choose several calibrator galaxies with accurately known distances, accurately measured photometric properties and hydrogen profile width, and near edge-on orientation. They enumerate “known” photometric and spectroscopic data Table 2, and seem primarily concerned with applying specific magnitude corrections with the data before plotting magnitude and distance against rotational velocity.

They intended to look in the Virgo Cluster for galaxies meeting their specifications, and couldn't find many. In this section, they are concerned with correctly identifying the angle of inclination of the galaxies surveyed, and they ultimately use their data to calculate the distance to the Virgo cluster. Then, they show the steps leading to their distance modulus expression incorporating hydrogen profile width.

In the Ursa Major cluster, they find that the width-luminosity correlation does not vary with galaxy type, and they again posit a distanced modulus expression. Against their findings they compare the Sandage and Tammann distance measurement, with which they are not consistent. In order to explain this, they argue against the inclusion of the “Southern extension” and the luminosity classification system in the ST IV analysis. They add as an aside that they are optimistic about an “intrinsic link between the phenomenological concept of luminosity class and our more quantitative global profile width.”

Provided that they are right about the dissonant measurements being wrong, Tully and Fisher derive a new value for the Hubble constant. In a discussion on a revised Sandage and Tammann calculation, they are forced to admit that the “extragalactic distance scale is in doubt.”

In their conclusion, the authors restate their moduli and stress the need for obtaining radio-photometric data and extending their study to other galaxies.