Fitting some galaxy rotation curves using the 'constant Lagrangian' model for galactic dynamics.

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The velocity rotation curves of the SPARC database present an opportunity to test the 'constant Lagrangian' model for galactic dynamics. The fits of the rotation curves from thirteen different galaxies are presented.

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I. FITTING ROTATION CURVES USING THE 'CONSTANT LAGRANGIAN' MODEL FOR GALACTIC DYNAMICS

In a previous paper I introduced the 'constant Lagrangian' model for galactic dynamics. In a subsequent paper I gave a more brief description of the 'constant Lagrangian' model. In this paper I just present some fitting results. For the model, I refer to the previous two papers (de Haas, 2018a,b). For the rotation curves I used the experimental velocity rotation data of galaxies in the SPARC database, provided by (Lelli et al., 2016).

I present the plot of V_{orb}^2 against r, with in each plot the experimental values in red stars and the theoretical values in black bars. The fitting plots are given with one single fit for M and R, this is the pure model. In the model there is a free parameter based on M and R. In the galactic time bubble model, these two act as one single'free' parameter for every single measurement, because the time-bubble through L as a constant constraint leaves only one degree of freedom. The locked in through L variation of M and R can be monitored using the apparent model mass density of the bulge ρ_{bulge}. This density varies as M, with locked in R, varies. With this parameter freedom of one single value, M and with locked R in L and ρ_{bulge}, some real parameter can be mimicked. But will not be used in this paper.

The most important cut in the model is the change from the model bulge to the model empty space around it. In the model bulge, $V_{orb}^2 \propto r^2$, outside the model bulge $V_{orb}^2 \propto -r^{-1}$. In the plots, M is given in $2 \cdot 10^{40} kg$ and R is given in kpc.

II. THE ROTATION CURVE FITS

The data from the following fitting curves are from (Lelli et al., 2016) and were retrieved from the data website of SPARC. The free parameter of the model hasn't been used in the following fits. The values of M and R were fixed for each galaxy. What hasn't been done is to include the error bars of the measured velocities. This will be done in a later publication. The purpose of these fits is to see to what extend the model can handle the big range of real galactic variability. The details of error bars are a concern for later. All the fits are done in Excel, the graphs are the print-screens.

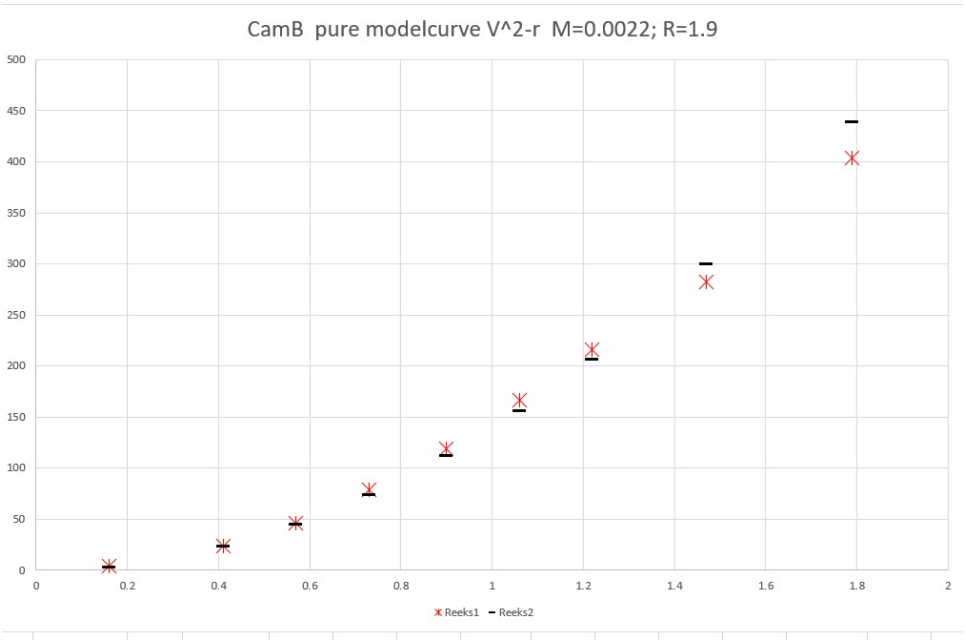

FIG. 1. Rotation curve fit of galaxy CamB

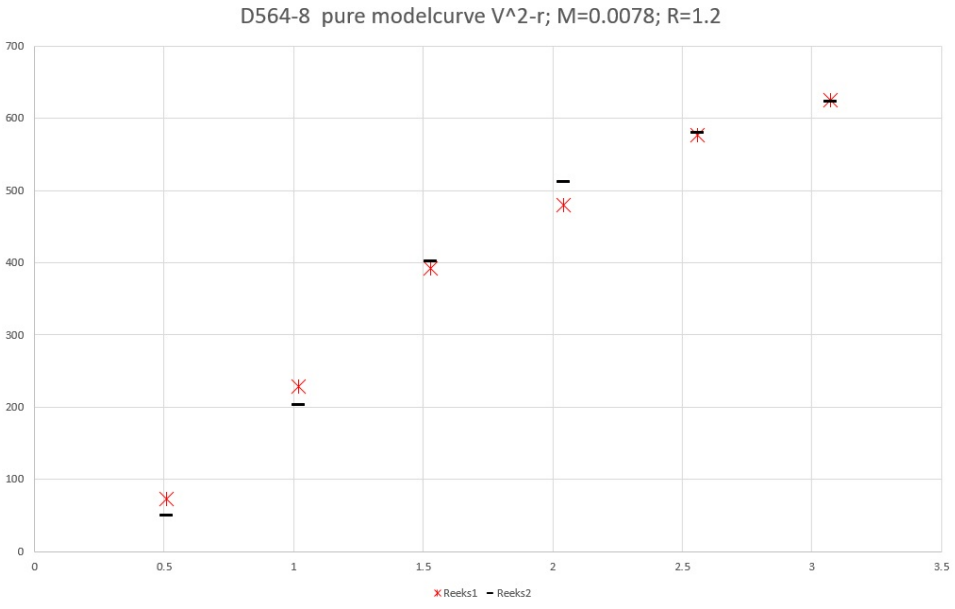

FIG. 2. Rotation curve fit of galaxy D564-8

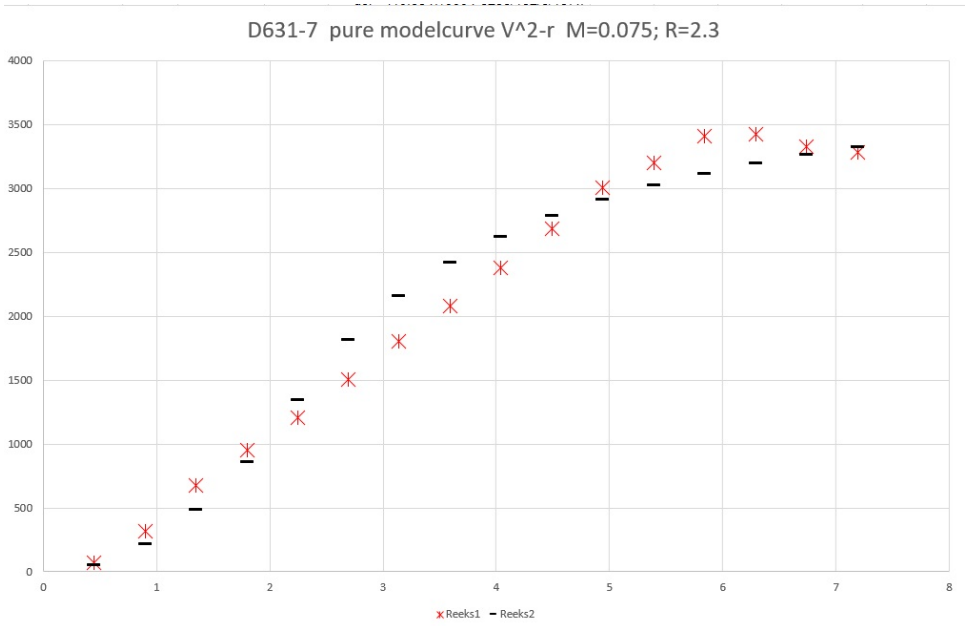

FIG. 3. Rotation curve fit of galaxy D631-7

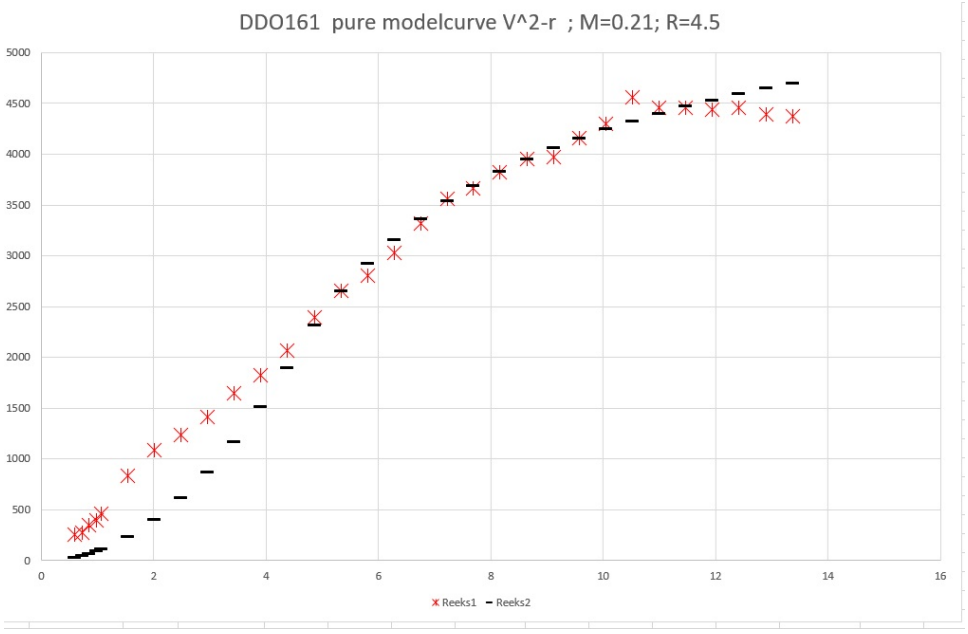

FIG. 4. Rotation curve fit of galaxy DDO161

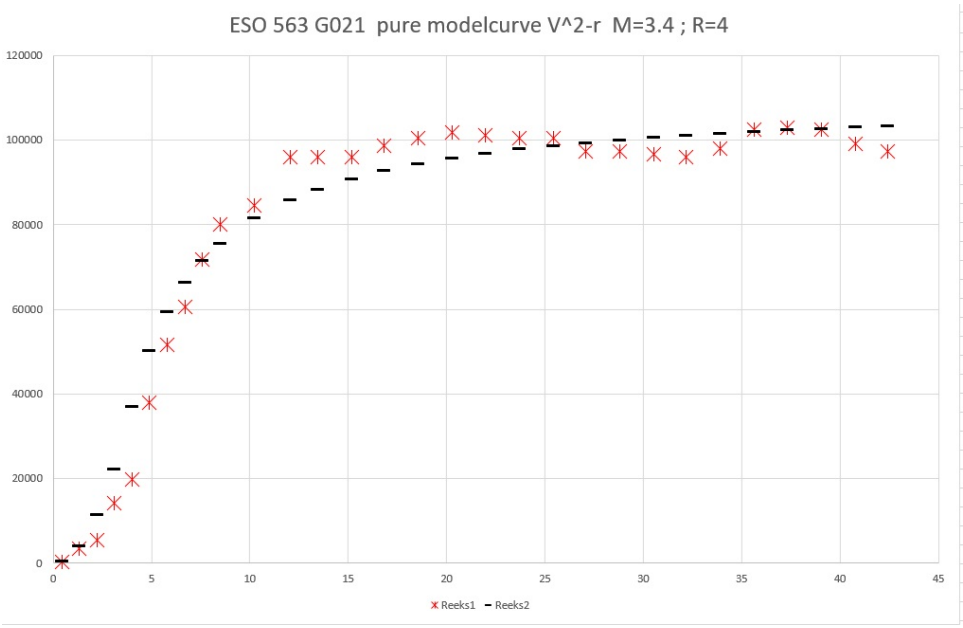

FIG. 5. Rotation curve fit of galaxy ESO 563 G021

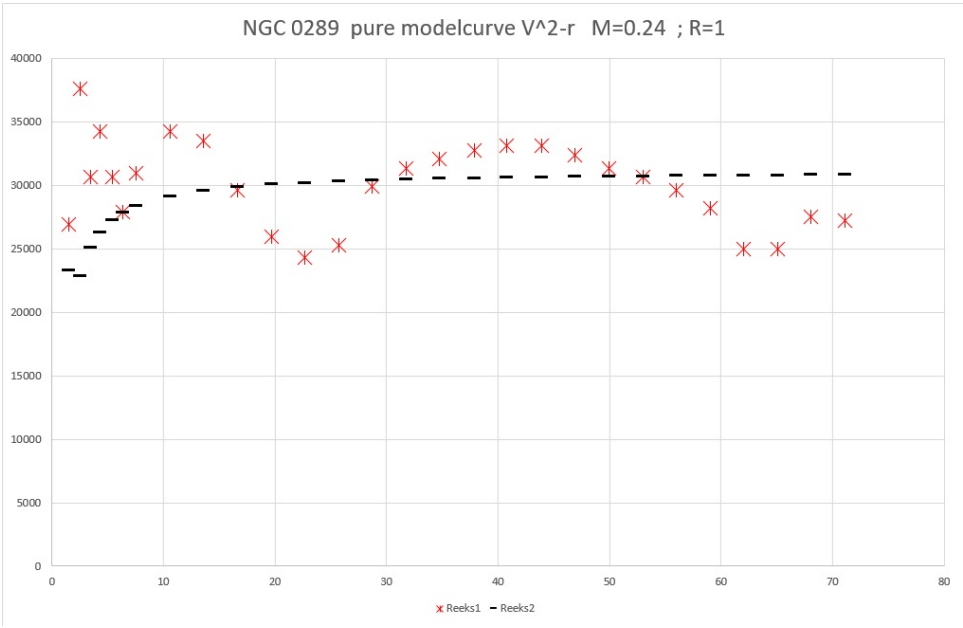

FIG. 6. Rotation curve fit of galaxy NGC 0289

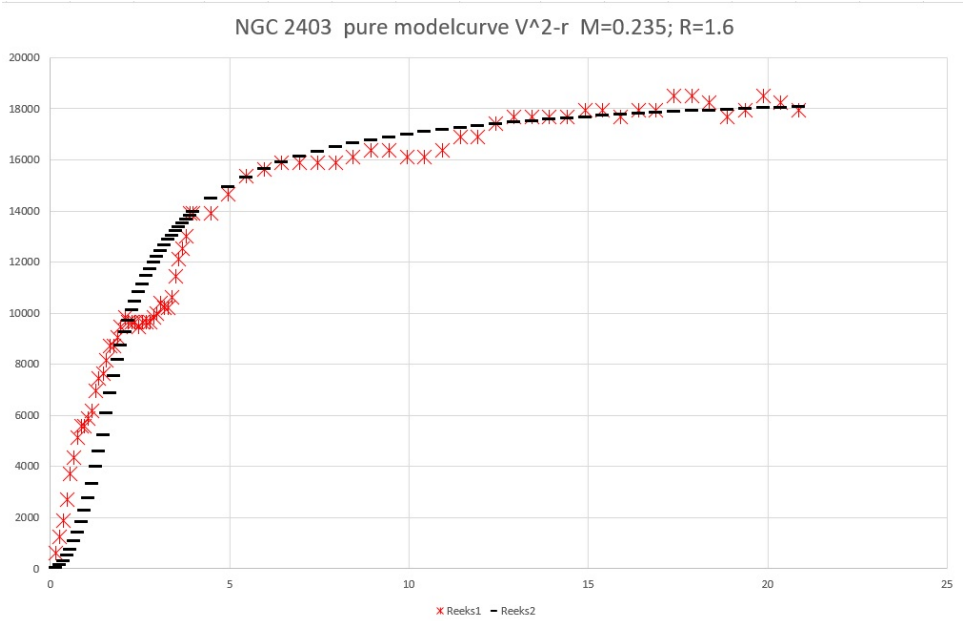

FIG. 7. Rotation curve fit of galaxy NGC 2403

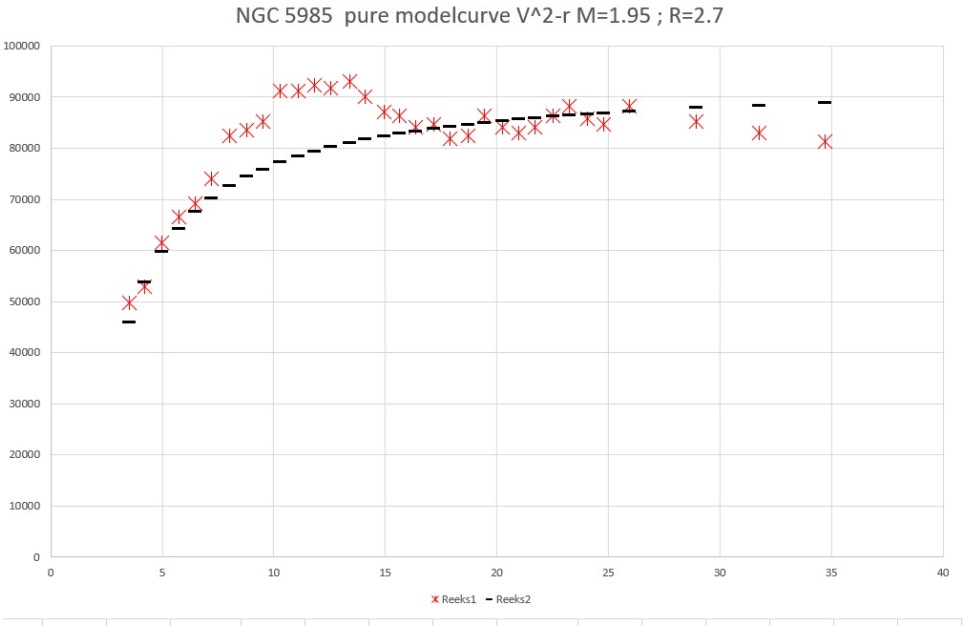

FIG. 8. Rotation curve fit of galaxy NGC 5985

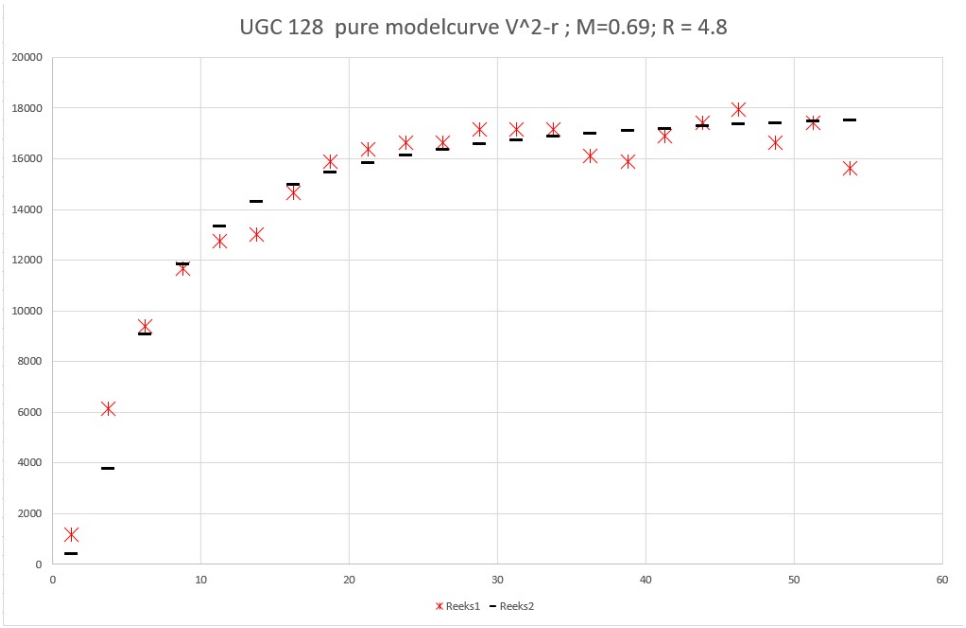

FIG. 9. Rotation curve fit of galaxy UGC 128

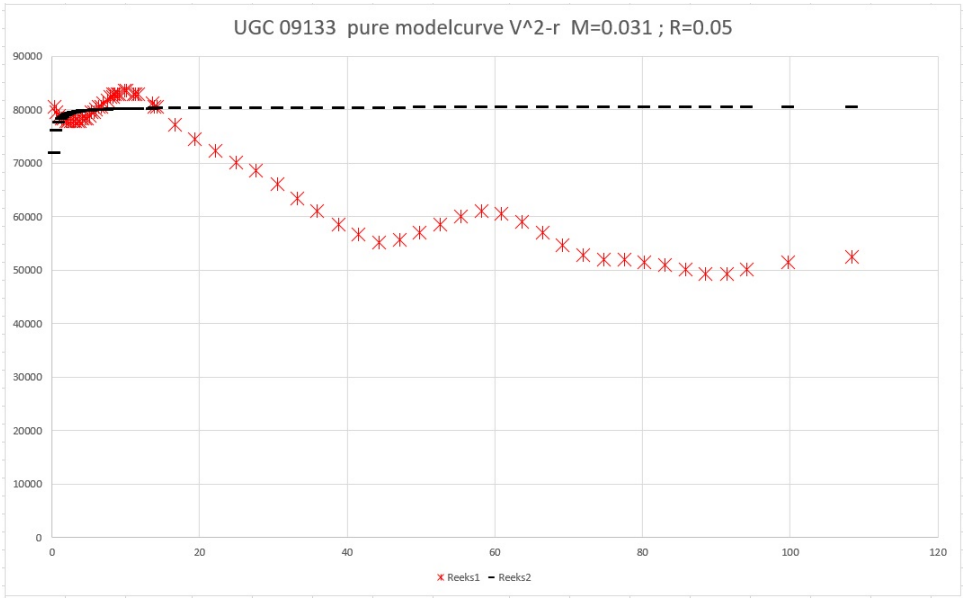

FIG. 10. Rotation curve fit of galaxy UGC 00133

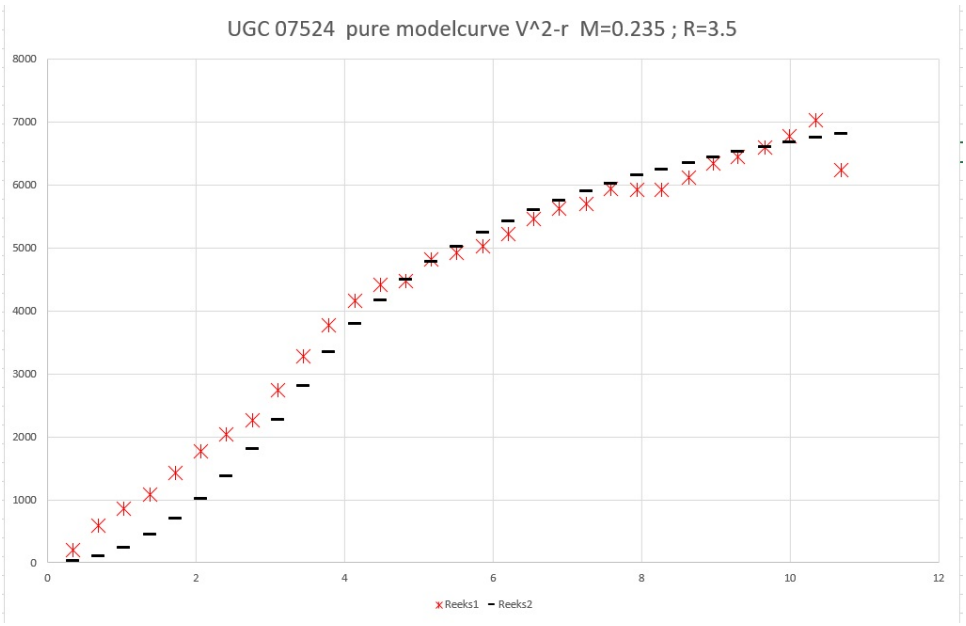

FIG. 11. Rotation curve fit of galaxy UGC 07524

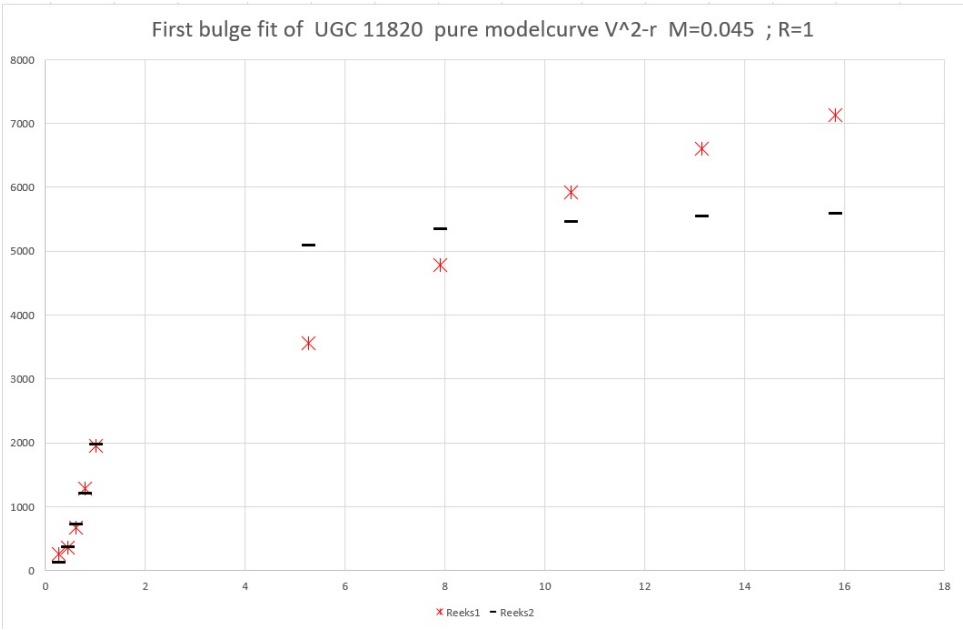

FIG. 12. Rotation curve fit of galaxy UGC 11820 first fit

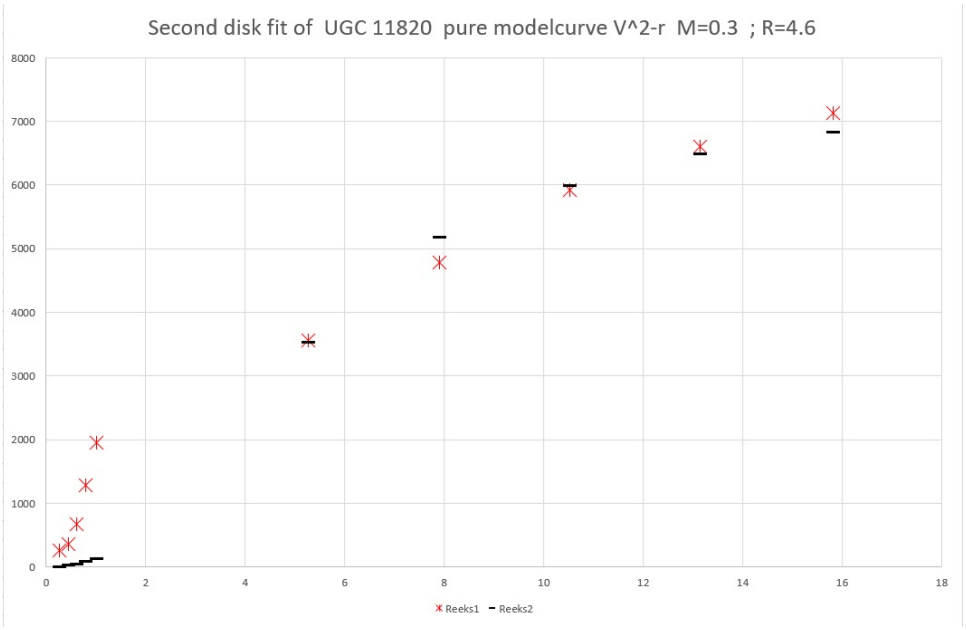

FIG. 13. Rotation curve fit of galaxy UGC 11820 second fit

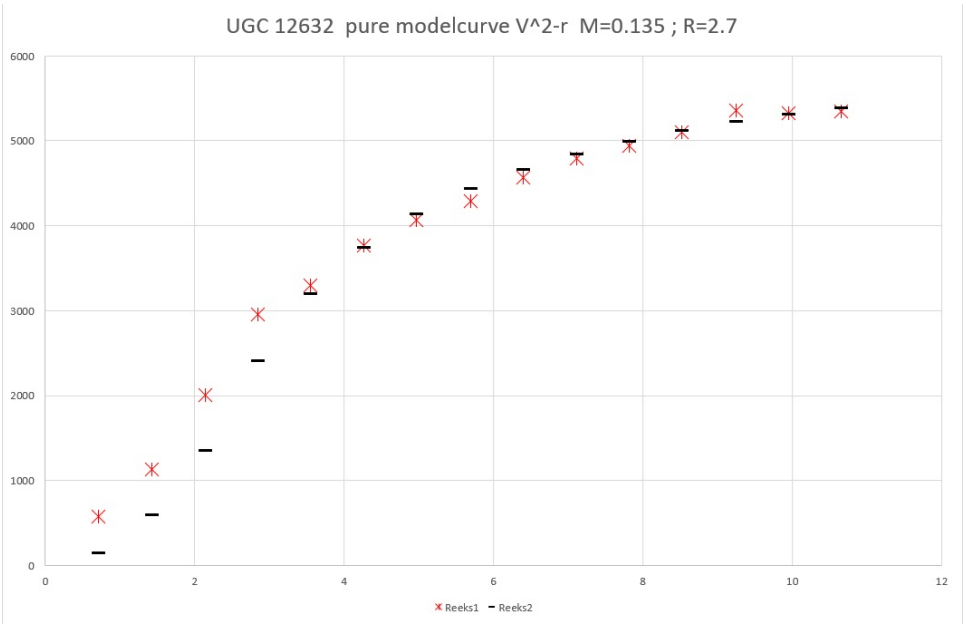

FIG. 14. Rotation curve fit of galaxy UGC 12632

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