Integral and discrete calculation of galactic masses – a comparison

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Objective

The comparison of two fundamental calculation methods, commonly used to determine galactic masses and orbital speeds, is followed by the evaluation of the basis for the existence of dark matter. In addition to works by E. Masso and A. Bosma, an EXCEL program is used to help determining the orbital speeds masses, solve the many-body-problems of galaxies, and check for the existence of dark matter.

The EXCEL program uses only discrete calculation to produce results.

Fundamentals of the calculation

Currently, two different methods are available to determine the mass of a galaxy:

1. Center oriented, mass integrated calculation method; this method is preferred by modern scientists. Only the masses within a mass's visual orbit around the galactic center matter.
2. Discrete, forces and measuring points oriented calculation method; with the help of an EXCEL program. All masses in a galactic plane matter.

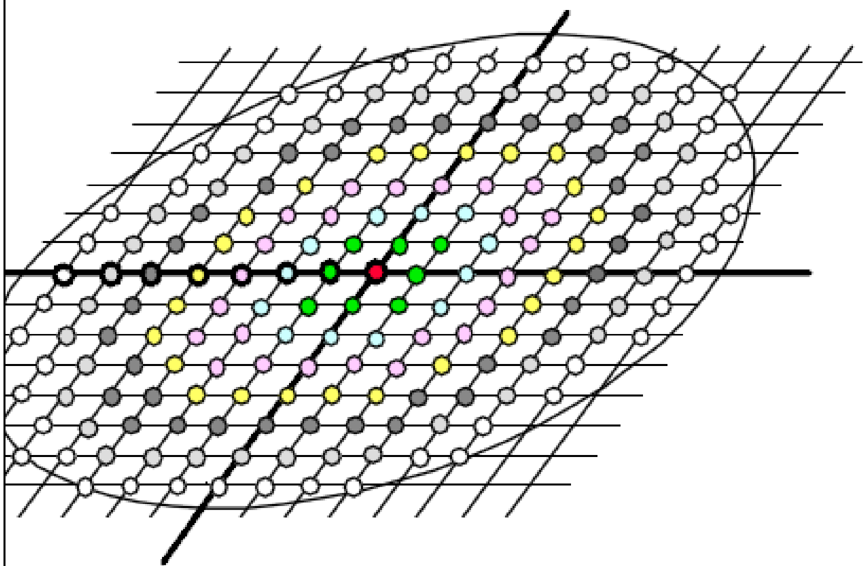
In this example, the galactic field consists of a rotation symmetrical plane with 357 mass points. It has 10 measuring points from center to edge.

Expectations

It is expected that both calculation methods deliver comparable results. Minimal differences of approximately 1% can be expected, because of grid lining necessary for the discrete calculation (Krause, 2005).

Figure 1

The gravitational force of each mass point toward the observed measuring point is calculated separately, and the results are then combined. This method provides the correct gravitational force, rotation point, and the according mass equivalent of the galactic mass on a specific measuring point. The EXCEL sheet uses this form of discrete calculation.



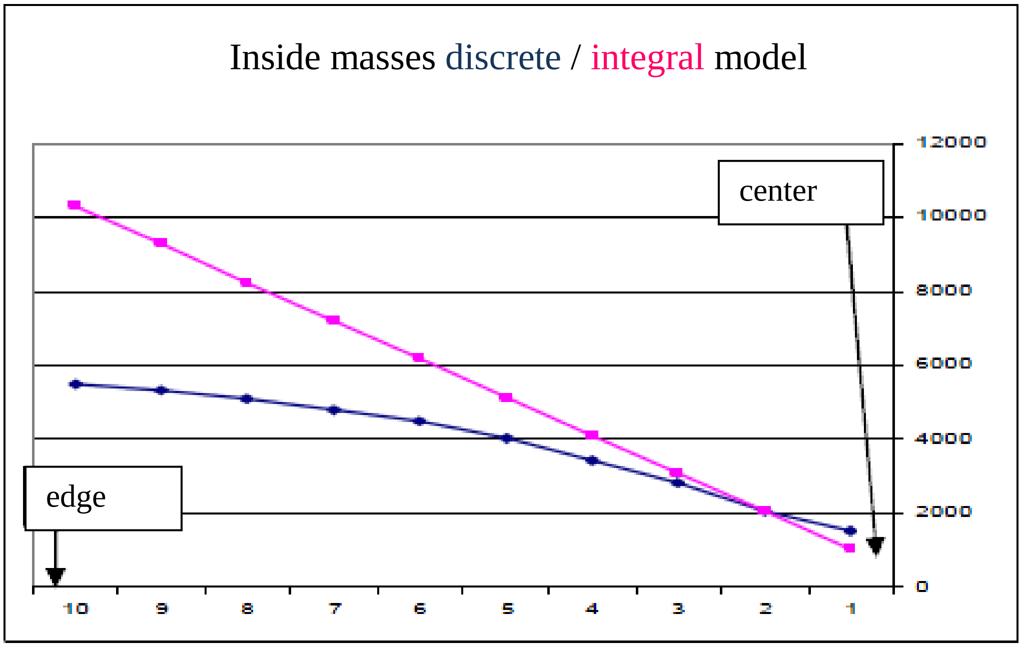
The grid lined galactic field

Mass increase from center to edge – center oriented, integral calculation method

The integral calculation method easily shows that the visible mass of a galaxy is 10 times smaller than required to keep the orbital speeds constant (Masso, 1995). It is commonly accepted that for a constant orbital speed, the mass of a galaxy has to increase linearly. The violet curve in *Figure 2* illustrates such a mass increase. Since, however, the visible mass of a galaxy decreases toward its edge, the existence of a dark matter is necessary. Modern literature assumes a visible to dark matter ratio between 9 : 10 and 1 : 10 (SUW Spezial, 2004). Nevertheless, concrete values do not exist. Bosma (2003) even notes a ratio of “5-6 : 1” (p.1).

The visible matter and the existing mass of a galaxy are determined with the help of the brightness to mass ratio, which, according to Bosma (2003) and Masso (1995), is not an exact science and widens the margin for error.

Figure 2



The addition of inner masses shows the increase of mass toward the edge of the galaxy. In this example, the galaxy has 10 measuring points. Both models with different mass increases are shown.

Measuring point oriented, discrete calculation with EXCEL data sheet

If the visible masses in a galaxy are added discretely (with constant orbital speed) and center oriented, the curve increases, but the increase slows down toward the edge (black curve in Figure 2). The discrete calculation uses the masses than exert gravitational forces on the measuring points, because the inner masses used for the integral calculation do not exist.

A comparison between the two calculation methods reveals that the ratio between visible and dark matter varies. While the integral method results in a ten times bigger mass than visible, the discrete method adds up to only 2.13 times the visible mass.

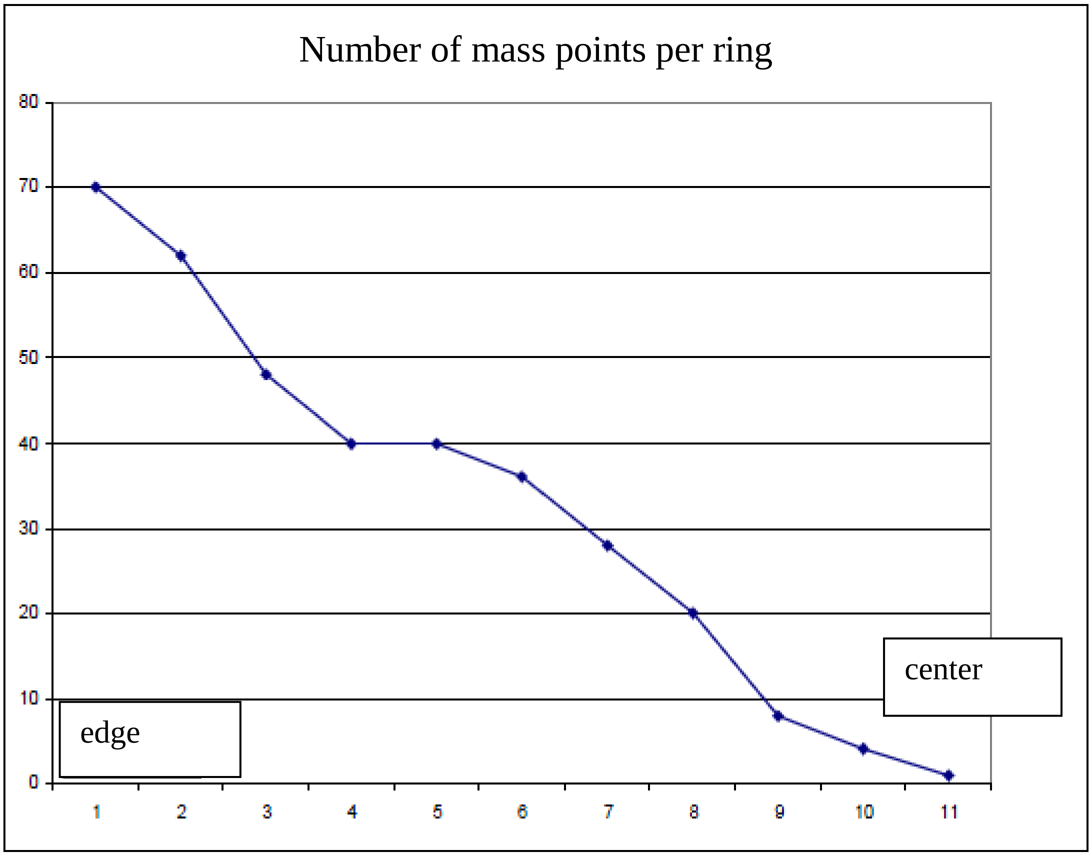
Reasons for this difference

The integral calculation uses the inner masses of one orbiting measuring points. However, the inner masses do not represent the entire mass that influences the measuring point. Hence, the combined mass of the galaxy is reduced before the calculation begins, which causes the masses toward the edge to be too big.

The difference between the two methods is therefore real and artificial. Both differences combined result in a discrepancy of the factor 10. Such a big difference in visible and calculated combined mass is nonexistent in the discrete calculation model. Here, the discrepancy shrinks by 4.7 to 2.13 times the realistic mass value (10 : 2.13 = 4.7).

The center oriented distribution of masses in a galaxy with a mass increase toward the edge as suggested by the integral method fails to mirror reality correctly.

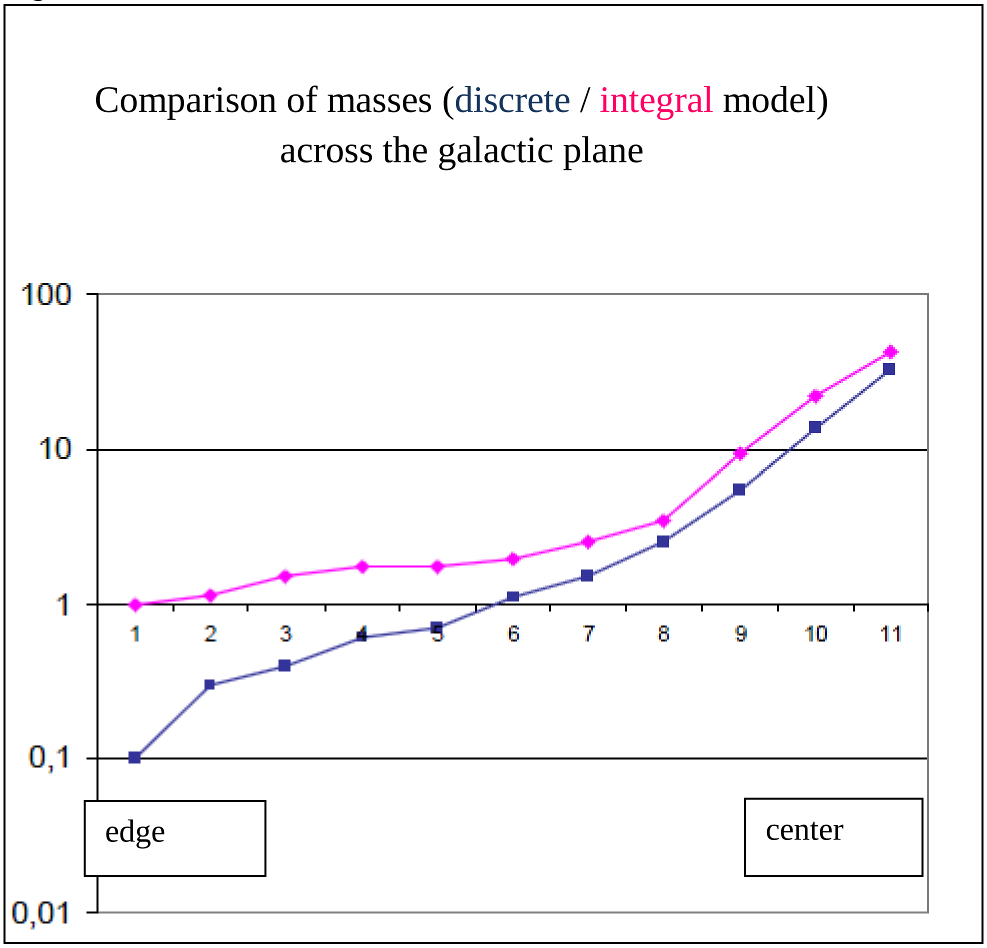
Figure 3



The number of mass points per ring in a galactic plane grows with the increasing distance from its center (to the left of the image). In Figure 1, the mass points of different rings are represented by different colors. The increase is not perfectly linear, because of the grid lining of the plane.

The distribution of the continuous linear mass increase of the integral model (*Figure 2*) and the continuously decreasing mass increase of the discrete model 2 in the rings of the plane model (*Figure 3*) indicates a continuous decrease of mass toward the edge of the plane. Consequently, if both models are recalculated to show the real mass distribution, the mass of each mass point decreases toward the edge, which can be seen in Figure 4.

Figure 4



The actual mass distribution in a galaxy

Even though the curves are not even because of the grid lining of the model plane, they illustrate the main point: the masses toward the edge of a galaxy calculated with the discrete method (black curve) reach only one tenth of the masses determined over the integral calculation. However, this only applies for the masses at the edge, not the combined mass of the galaxy. Attention: the axis is logarithmic!

The visible masses at the edge of the discrete model have (and only need) one tenth of the value of the integral model to have the masses move at a constant speed. The absolute mass value of a galaxy with the integral calculation is 2.13 and with the discrete calculation is 1. In both models, the masses move at the same speed. The different results are caused by differences in assumptions before the actual calculation.

Comparison of the two calculation models (for a plane)

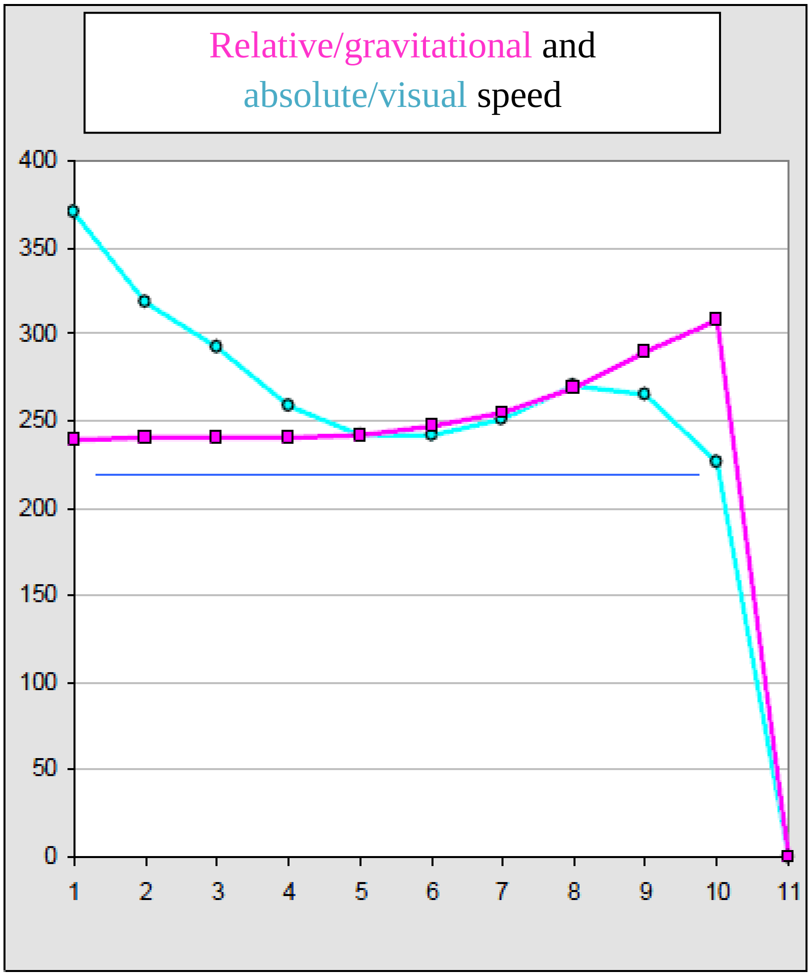
Model / Details	Center-oriented integral	Measuring point-oriented discrete
Foundation	Visual libration orbits	Actual gravitation orbits
Predetermined visual orbital speed of masses	225 km/sec	225 km/sec
Calculation method	Center-oriented, mass integral	Measuring point-oriented, discrete, addition of forces
Ratio of masses close to edge and close to center	10 :1	4.7 : 1
Number value of gravity exerting mass on a mass close to edge	10	4.7
Combined real galactic mass (factor)	2.13	1
Size of mass factor (masses close to edge) to reach orbital speed	10	1
Virial Theorem	Valid with the exception of one additional mass	Valid
Ratio of orbiting center mass and orbiting mass close to edge	100 : 1	1000 : 1
Type of mass	90% unknown matter 10% visible matter	Only visible matter
Postulates	90% dark matter	None
Visible mass distribution and model	Not valid	valid

The orange fields mark faulty assumptions, which lead to wrong results (red).
The two calculation methods are very different from each other.

A note

The combining of multiple masses as one center mass does indeed simplify the calculation process, but it leads to faulty results in galactic many-body-problems (Krause, 2005). In addition, these errors in calculation are the basis for an unknown and never measured “dark matter”.

Taking visual instead of gravitational relevant values and adding masses linearly instead of to the square are the real reasons for the faulty calculation (Masso, 1995).



If the results of an integral calculation are applied to the discrete model, the visual orbital speeds of masses (light blue curve) are above the measured values (blue curve) throughout the entire galactic plane.

The discrete calculation model, however, produces the expected results (Krause, 2005). The average galactic mass of a sun lies slightly below that of earth's sun (0.78 – 1.00 M sun). The orbital speeds of galactic masses from center to the edge are at a constant 225 km/sec. A discrete calculation of the visual orbit through gravitational forces of masses and the determination of a gravitational radius for orbiting masses result in the expected values. These are equal to the values found in reality. The visual number of masses and even the mass distribution in a galaxy are sufficient to produce the expected results. A "dark matter" is completely unnecessary.

The discrete model even shows the very low number of masses toward the edge of the galaxy (< 1 : 1000 edge – center). Furthermore, it can be used to explain how halo-objects are bound to a galaxy and move at a constant speed of 225 km/sec.

Unlike the integral method, the discrete calculation is therefore in sync with reality.

Conclusion

The expected similarity of results did not occur. The combined mass of a galaxy differs by +113% and the size of masses close to the edge differ by close to +1000%.

The integral calculation method is therefore not equipped to correctly solve many-body-problems; and the assumption of a "dark matter" is nothing but an attempt to hide its inadequacy. "Dark matter" is the result of a miscalculation, and cannot be used to support a big bang.

References

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