

Predicted kinematics of the enigmatic galaxy NGC 3450

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The reader is referred to the photograph [1]. The predicted directions of the orbits and of the pattern rotations are stated here relative to that photograph.

NGC 3450 is remarkable because it appears to have two spiral arms in the bar which open in the opposite sense to the spiral arms of the disk.

The predicted kinematics are based on a new theory which was developed using software which calculates the precession rates of orbits in galaxies [2].

Predicted kinematics of the disk

The disk orbits are clockwise.

The disk pattern rotation is clockwise.

The disk pattern rotation is in the same direction as the disk orbits.

The disk spiral arms are trailing relative to the disk orbits..

The disk spiral arms are trailing relative to the disk pattern rotation.

Predicted kinematics of the bar

The bar orbits are anti-clockwise.

The bar pattern rotation is clockwise.

The bar pattern rotation is in the opposite direction to the bar orbits.

The bar spiral arms are trailing relative to the bar orbits.

The bar spiral arms are leading relative to the bar pattern rotation.

Predicted relationship between the disk and the bar

The bar orbits (anti-clockwise) are in the opposite direction to the disk orbits (clockwise).

The bar pattern rotation (clockwise) is in the same direction as the disk pattern rotation (clockwise).

Predicted coupling of disk and bar

Based on of the positions of the inner ends of the disk arms relative to the size and alignment of the bar, it is likely that the pattern rotation rates of the bar and of the disk are equal.

So, although their orbits are in opposite directions, and although their spiral arms open in opposite directions, the patterns of the bar and of the disk precess in the same direction (clockwise) and at the same rate.

Conclusion

Based on a new theory, this paper presents a simple kinematic model of NGC 3450 in which the bar and disk co-precess.

References

[1] Crocker, D.A., Jones, L.V.
Photograph of NGC3450
kudzu.astr.ua.edu/gvatlas/sb/ngc3450.html

[2] Edgeworth, S.
Galactic bars in power-law fields
www.orbsi.uk/space/research/se/pdf/galactic-bars-in-power-law-fields.pdf