SUMMARIES OF PAPERS PRESENTED AT
THE RAS SPECIALIST DISCUSSION ON
THE STRUCTURE OF GALAXIES

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PERTURBATIONS OF GALACTIC ORBITS

By D. Lynden-Bell
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It is the gravitational action of the stars populating one orbit on those
populating another that is of primary importance in galactic dynamics. If
there is a set of axes in which two orbits exactly close, then the orbits produce
steady torques on one another so these gravitational actions are greatly
enhanced. As I described in Monthly Notices a year ago, in certain conditions
the resultant changes will align the orbits with one another to form bars. Such
bars, and indeed any symmetrical oval distortion, will drive a spiral density
distribution on any dissipative gas even without any self-gravity. I think it is
this dissipation, not the propagation of density waves, that is responsible for
the spirals we see in galaxies. Following earlier work—some of it done here
in Cardiff—the thesis of M. P. Schwarz of Mount Stromlo fully explores the
behaviour of gas in these circumstances, and I recommend its perusal to
those studying spiral galaxies.

LEADING AND TRAILING STRUCTURE IN A SIMULATED GALAXY

By R. A. James and A. Wilkinson
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Following early work by Sellwood, we have performed three-dimensional
particle-mesh simulations of disk galaxies to explore the effect of varying the
initial velocity dispersion. Our model includes a rigid, spherical Population-II
halo, contributing 80 per cent of the mass inside a radius of 20 kiloparsecs.
The halo follows one of Michie and Bodenheimer’s models, which Lynden-
Bell has shown to apply to collisionless systems. The rotation curve is nearly
flat between 8 and 20 kiloparsecs.

A cold start, with the stars initially in circular orbits, gave variable structure
up to $6 \times 10^8$ years and then a nearly featureless disk. We ran a warm-start