

## Preface

Before the XXV<sup>th</sup> General Assembly in Sydney in 2003, there had not been an IAU Symposium on the topic of dark matter since Symposium 117 at Princeton in 1985. Considering the importance of dark matter and the advances which had occurred in the intervening period, another IAU Symposium on this topic was long overdue. The specific motivation for IAU Symposium 220 “Dark Matter in Galaxies” came from the disparity between the successes of the Cold Dark Matter (CDM) model (and its variants) on large scales, and its perceived failings on the scale of galaxies. In particular CDM provides a quantitative understanding which links the rich structure of the present-day Universe with the minute fluctuations in the cosmic microwave background, and traces these fluctuations right back to the physics of the early Universe. Yet on smaller scales, within galaxies themselves, we see little evidence of the sharply peaked central density profiles of dark matter halos predicted by CDM; nor is the predicted dark matter halo substructure evident in the form of counterpart visible structures. These problems lead us to ask what the properties of galaxies are telling us about the nature of dark matter, and whether these discrepancies are simply manifestations of the complex physical interactions involved in the galaxy formation process?

In designing the Program for Symposium 220, the Scientific Organising Committee included some structured debates on key topics. Three topics were chosen, each with a half-day session, including 6 presentations of 15 minutes each, and then 90 minutes of open debate with the discussion led by a moderator and the six speakers serving as an expert panel. The three topics of debate were:

- How serious are the problems faced by Cold Dark Matter? I. Central density cusps, thin disks and dark halo substructure
- What role is played by baryonic dark matter?
- How serious are the problems faced by Cold Dark Matter? II. The shapes and extent of dark halos

Each of these topics yielded lively discussion and some progress in clarifying the various issues. Although the very large auditorium did not encourage audience participation, these topical sessions worked surprisingly well. The majority of the panelists taking part in the debates have written up their perspectives in papers which appear in this volume; they appear as the invited papers in separate sections, named by the topic of the debate. The three moderators summarised the progress made in each of these topical sessions: one of these summaries is included in the proceedings.

The Editors