AGN FEEDBACK IN GALAXY FORMATION

During the past decade, convincing evidence has been accumulated concerning the effect of active galactic nuclei (AGN) activity on the internal and external environment of their host galaxies. Featuring contributions from well-respected researchers in the field, and bringing together work by specialists in both galaxy formation and AGN, this volume addresses a number of key questions about AGN feedback in the context of galaxy formation.

The topics covered include downsizing and star-formation timescales in massive elliptical galaxies, the connection between the epochs of supermassive black hole growth and galaxy formation and the question of whether AGN and star formation coexist. The book also discusses key challenging computational problems, including jet–interstellar/intergalactic medium interactions, and both jet- and merging-induced star formation.

Suitable for both researchers and graduate students in astrophysics, this volume reflects the engaging and lively discussions taking place in this emerging field of research.

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Preface

During the past decade, convincing evidence has been accumulated concerning the effect that AGN activity has on the internal and external environment of host galaxies. At intermediate and relatively high redshifts (z-0.2–1.5) evidence for this interaction comes, for example, from the optical–radio alignment and from the observation of jet-induced star formation. In the nearby universe there is also a series of significant indications: the observation of recent episodes of star formation in otherwise old or early types of ellipticals has emerged from analyses of the SDSS. There is also more direct and circumstantial evidence from the analysis of regions such as the Minkowski object, or the distribution of star-forming regions around the nearby radio envelope of Cen A, and from the enhanced star formation seen in some satellite galaxies of active galaxies at relatively high redshift.

Parallel and somewhat independently from this more direct evidence, the study of galaxy evolution has provided the astrophysical community with challenging new questions. The availability of large-scale photometric and spectral surveys such as the 2dF and the Sloan Digital Sky Survey has made it possible to discover evidence for evolution of the stellar formation features on timescales that are very short, in cosmological terms. The paradigm thus emerging in the astrophysical community is that AGN activity could be tightly connected to these phenomena, and could be capable of affecting the evolution of stellar populations within galaxies.

The purpose of the Oxford–COSMOCT workshop on *The Interface Between Galaxy Formation and AGNs*, which took place on the island of Vulcano, Italy, from May 18th to 22nd, 2008, was to bring together two communities, studying galaxy formation and AGNs, with a view to better understanding AGN feedback in the context of galaxy formation. The observational connection also included more specific observational and theoretical evidence, such as jet-induced star formation, and the association of starbursts with AGNs and superwinds. The Scientific Committee put special emphasis on some central questions, which included the following: Is AGN feedback necessary to appreciate why the most massive

galaxies are red and dead? How do we understand downsizing and star-formation timescales in massive ellipticals? Can AGN provide positive as well as negative feedback for galaxy formation? What is the connection between the epochs of SMBH growth and galaxy formation? What is the evidence for jet-induced star formation? Do AGNs and star formation coexist, and is there a causal connection? This volume collects the proceedings presented by most participants, and reflects the lively discussions on the observational and computational problems connected to the phenomenology of AGN feedback on their host galaxies. Particular care has been taken in discussing some key challenging computational problems, including (among others) jet–interstellar/intergalactic medium interactions, jet-induced stellar formation, and merging-induced stellar formation.

The subject of AGN feedback on their host galaxies, with all its rich observational phenomenology, is a relatively young one. Many different phenomena, such as the massive outflows from post-starburst galaxies, galaxy colour bimodality and others, can be projected into the perspective of the mutual interaction between AGN activity and galaxy formation. The workshop was the first one specifically dedicated to discussing this emerging paradigm, and we believe that the efforts made by the participants and by those who contributed to this volume will be useful for the astrophysical community at large.

The generous contributions from our sponsors, mentioned below, provided the necessary resources to organise this event. Special acknowledgment should be given to the technical and administrative staff of INAF, Catania Astrophysical Observatory, and particularly to Luigia Santagati for her dedication during the preparatory phases, and to Alfio Giuffrida and Piero Massimino, who brought a decent WiFi IT connection to the workshop's site, and cared especially that it would work efficiently for the entire duration. We would also like to thank the secretarial staff, and in particular Stavro Ivanovski and Alessio Romeo, who kindly provided their help always with a smile.

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