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The Spectral Energy Distribution of Galaxies

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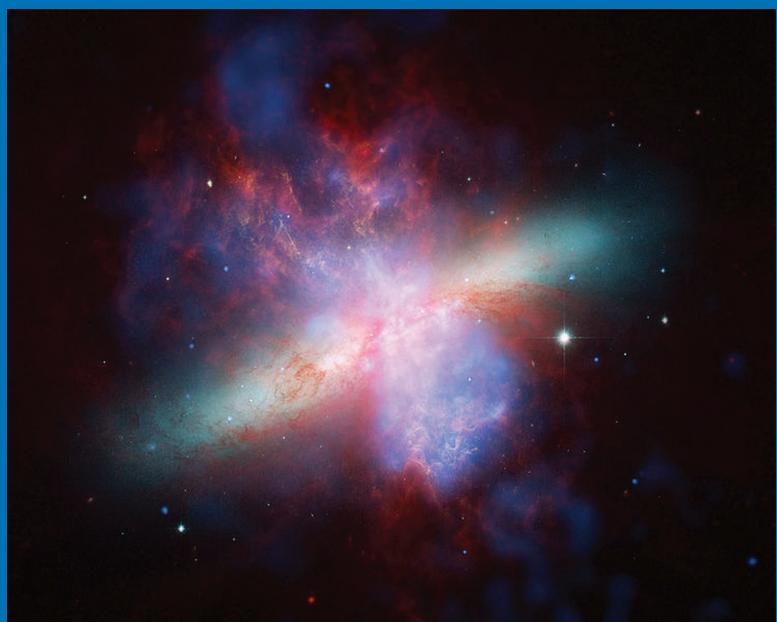
Richard J. Tuffs
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THE SPECTRAL ENERGY DISTRIBUTION OF GALAXIES

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M82 as viewed by Chandra in X-rays (blue), HST in $H\alpha$ (orange) and visual continuum (green), and by Spitzer (red).

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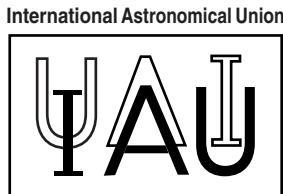
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Preface

IAU Symposium 284 “The Spectral Energy Distribution of Galaxies” was held in Preston (UK), between 5th and 9th of September 2011. Jointly organised by the University of Central Lancashire (Preston) and the Max-Plank Institut für Kernphysik (Heidelberg), the symposium was attended by participants from 33 different countries from Europe, North America, South America, Asia, Africa and Australia/Oceania, with a balanced representation between professors, senior scientists and young career scientists, postdoctoral fellows and PhD students.

The symposium brought together developers and users of self-consistent physical or semi-empirical models for the emergent panchromatic spectral energy distributions (SEDs) of galaxies ranging over the complete accessible spectral range from gamma-rays to radio. Motivated by the rapid development in the corresponding observational capabilities in the last decade, the main goal of the symposium was to provide a forum for the interaction of modellers with both observers assembling multiwavelength datasets on galaxies and theoreticians considering fundamental physical processes in galaxies.

The program was fashioned to reflect the interconnections between the very broad range of physical processes responsible for the panchromatic photon output of galaxies. This embraced the formation, evolution and emission of stars; accretion-driven sources of photons; the chemical and physical properties of the interstellar medium, including both the gaseous and solid-state components and their interactions with ambient photon fields; and high energy processes involving cosmic rays. On the last day a final session was dedicated to models for the evolution of the panchromatic SEDs of galaxies over cosmological time, thus linking the detailed physical processes in individual galaxies discussed earlier in the week with the photon output of the Universe.

All of these topics have, of course, been the subjects of many dedicated individual symposia in the past, attended largely by their own specialized communities. However, IAU symposium 284 was unique in its concept of connecting the topics and bringing together the communities (or at least making a significant step towards achieving this). A particular challenge of this concept was to avoid the symposium becoming a sequence of self-contained mini-workshops or tutorials on each of the constituent topics, addressing selected topical issues directed at, and attended by, one particular community. However, in this respect any prior concerns proved to be completely unfounded. All the delegates, representing a mix of theoreticians, observers, and specialists in the many technical and astrophysical subfields needed to build SED models, proved to be enthusiastic and proactive participants throughout the week, generating many perceptive, and sometimes unexpected interdisciplinary discussions following both the oral presentations (many of these discussions could be documented for inclusion in the proceedings) and in the poster sessions. There were no parallel sessions.

In general, the intellectual atmosphere was open and constructive, with several known examples of new collaborations arising from discussions initiated at the symposium. For this, particular thanks must go to the authors for their careful preparation of the presentations. These were generally well directed to the broad audience, while very effectively answering the call for papers to highlight techniques and results combining measurements made from across the electromagnetic spectrum. Indeed, this response to the symposium confirms the genuine need and demand for more effective quantitative analysis techniques to exploit the already copious amounts of multiwavelength data now available for galaxies near and far.

Acknowledgements

The broad and challenging scope of this symposium was particularly well suited to the framework and scale of an IAU Symposium. We would therefore like to thank first and foremost the IAU for entrusting us with this challenge. Our particular gratitude is addressed to the organising committee of the coordinating division for our symposium, IAU Division VIII “Galaxies & the Universe”. We are also very grateful to the broad support addressed by the other divisions and commissions of the IAU who recognised the interdisciplinary scope of our symposium, namely Division VII “Galactic System”, Division VI “Interstellar Matter”, Division X “Radio Astronomy”, Division XI “Space & High Energy Astrophysics” and Division IX Commission 21 “Galactic and Extragalactic Background Radiation”. Special thanks are addressed to the IAU’s assistant general secretary Thierry Montmerle for his untiring role in supervising the link between the IAU and our symposium. The large diversity of scientists attending the symposium would not have been possible without the generous grants offered by the IAU, which we gratefully acknowledge.

Much valuable advice on the science content of the meeting was provided by the Scientific Organising Committee which was comprised of Gustavo Bruzual (CIDA, Venezuela), Françoise Combes (LERMA, Paris, France), Andrew Fabian (University of Cambridge, UK), Jay Gallagher (University of Wisconsin, Madison, USA), Yu Gao (Purple Mountain Observatory, China), Hidehiro Kaneda (Nagoya University, Japan), Nikolaos D. Kylafis (University of Crete, Heraklion, Greece), Renée Kraan-Korteweg (University of Cape Town, South Africa), Carol Lonsdale (NRAO, USA), Cristina C. Popescu (co-chair, Jeremiah Horrocks Institute, University of Central Lancashire, Preston, UK), Vladimir Ptuskin (IZMIRAN, Moscow, Russian Federation), Elaine Sadler (University of Sydney, Australia), Laura Silva (INAF, Trieste, Italy), Richard J. Tuffs (co-chair, Max Planck Institut für Kernphysik, Heidelberg, Germany), Jacqueline van Gorkom (Columbia University, New York, USA), Barbara Whitney (Space Science Institute, Boulder, USA). Their input was instrumental in bringing together such an exciting mix of diverse communities.

Many thanks are addressed to Bogdan Păstrăv from the Jeremiah Horrocks Institute (JHI) of the University of Central Lancashire (UCLan) for the continuous, careful and tireless work he did to help with the logistics of the conference, from the early stages of the conference organisation to the days when the conference took place. We would also like to thank Giovanni Natale from JHI/UCLan for taking on responsibility for the conference organisation during the critical time of the countdown days before the event and during the symposium. Meiert Grootes and Ellen Simmat from the Max Planck Institut für Kernphysik are acknowledged for their invaluable work in helping with the design of the conference poster and with the webpage of the conference. Gabi Wiese of MPI-Kernphysik was instrumental in putting together the abstract booklet of the conference and, during the conference, for marshalling the gathering of discussions for this proceedings volume. Finally we would like to thank Emma Kelly, our conference officer, for ensuring the smooth running of the conference.

We were very fortunate to have benefited from the enthusiastic support of the PhD and master students from UCLan and MPI-Kernphysik during the busy days of the conference. They assisted with the IT, worked with the microphones, helped with the registration desk and were there in place if their presence was needed. Thanks to all of you: Nicky Agius, Ellen Andrae, Adam Clarke, Gareth Few, Meiert Grootes, Kelly Hambleton, James

Kelly, Michael Maxwell and Simon Murphy. Thanks also to the postdoctoral researchers and staff from the JHI/UCLan who helped in various ways with the conference organisation.

For the general public in Lancashire the days of the IAU Symposium were highlighted by the fascinating public talk given by the JHI/UCLan professor Don Kurtz on “The Beauty of Galaxies: from the Milky Way to the Beginning of Time”. We could not have been more proud of having such a distinguished speaker contributing to the other activities organised with the occasion of the IAU Symposium.

Our conference benefited from the generous financial support of the Great Britain Sasakawa (GBSF) foundation, which was used to support Japanese participants to attend the IAU Symposium. There is no doubt that the substantial numbers of Japanese astrophysicists attending the symposium would not have been possible without the Sasakawa grants. This, in turn, added significant value to the symposium, and, reciprocally, we believe, contributed to the propagation of the impressive results presented by our Japanese colleagues to the world wide community working in the field.

Our acknowledgements would not be complete without our thanks to the Dean of UCLan’s School of Computing, Engineering and Physical Sciences, Robert Wallace, for his full support of the conference and for his welcoming address to the participants of the IAU 284, at the reception taken place at the Harris Museum in Preston. Many thanks also to the UCLan’s Director of Research, Robert Walsh, for his enthusiastic speech addressed at the Harris Museum on the occasion of the conference reception.

Finally, our special thanks go to Professor Gordon Bromage, Head of UCLan’s Jeremiah Horrocks Institute, for his continuous encouragement and support of the conference and for his invaluable role in chairing the Local Organising Committee of the symposium.

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- The University of Central Lancashire



- The Max Planck Institut für Kernphysik



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