



POST MEETING REPORT FORM

for meetings other than Joint Discussions and Special Sessions

Deadline for Submission: within 1 month after the meeting

**the following information should be sent
to the IAU Assistant General Secretary**

The following documents should be attached:

- i Final Scientific Program
- ii List of participants
- iii List of recipients of IAU Grants, including amount and country
- iv Receipts signed by the recipients of IAU Grants (This does not apply to Scientific Meetings held during General Assemblies)
- v Brief report (text.txt file or word.doc) to the Executive Committee on the scientific highlights of the meeting (1-2 pages)

1. Meeting Number:

2. Meeting Title:

3. Coordinating Division:

4. Dedication of meeting (if any):

5. Location (city, country):

6. Dates of meeting:

7. Number of participants:

8. List of represented countries:

9. Report submitted by:

10. Date and place:

11. Signature of SOC Chairperson:

A handwritten signature in blue ink, appearing to be 'A. King', is written over the signature line.

IAU Symposium 279 “Death of Massive Stars: Supernovae and Gamma-Ray Bursts”
(March 12 – 16, 2012, Nikko, Japan)

Final Scientific Program

IAU Symposium 279 “Death of Massive Stars: Supernovae and Gamma-Ray Bursts”
(March 12 – 16, 2012, Nikko, Japan)

MONDAY, 12 MARCH

AFTERNOON SESSION:

MASSIVE STARS AND SUPERNOVAE (Chairperson: Pete Roming)

14:45-15:00 **N. KAWAI**

Welcome address

15:00-15:25 **K. NOMOTO**

Final fates of massive stars (INVITED)

15:25-15:50 **P. CROWTHER**

Environments of massive stars and the upper mass limit (INVITED)

15:50-16:10 **M. BERSTEN**

Hydrodynamical Models of Core-Collapse Supernovae (CONTRIBUTED)

16:10-16:40

COFFEE BREAK

16:40-17:05 **S. IMMLER**

X-Ray Emission from Supernovae (INVITED)

17:05-17:30 **R. QUIMBY**

Superluminous Supernovae (INVITED)

17:30-17:50 **J. VINK**

The Mass-Loss Dominated Evolution and Fate of the Most Massive Stars (CONTRIBUTED)

17:50-18:10 **I. ARCAVI**

Type II Supernova Light Curves from the Caltech Core Collapse Project (CONTRIBUTED)

18:10-19:30

Poster viewing Session

19:30-21:30 WELCOME RECEPTION

TUESDAY, 13 MARCH

MORNING SESSION:

MULTIWAVELENGTH EMISSION OF GRBs AND SUPERNOVAE (Chairperson: Sylvio Klose)

09:00-09:25 **T. SAKAMOTO**

GRB Prompt X-ray Emission (INVITED)

09:25-09:50 **T. KRUEHLER**

Optical and Near-Infrared Flashes of GRBs (INVITED)

09:50-10:10 **T. MORIYA**

Ultraviolet-Bright Type IIP Supernovae from Massive Red Supergiants (CONTRIBUTED)

10:10-10:30 **R. CHORNOCK**

Pan-STARRS1 Observations of Ultraluminous Supernovae (CONTRIBUTED)

10:30-11:00

COFFEE BREAK

11:00-11:25 **A. CASTRO-TIRADO**

Multiwavelength Observations of GRB Afterglows (INVITED)

IAU Symposium 279 “Death of Massive Stars: Supernovae and Gamma-Ray Bursts”
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11:25-11:45

S. CHAKRABORTI

Ultra High Energy Cosmic Rays from Engine-driven Relativistic Supernovae (CONTRIBUTED)

11:45-12:05

D. BURROWS

SN1987A: the X-ray remnant at age 25 years (CONTRIBUTED)

12:05-12:35

T. MONTMERLE

Restructuring the IAU: A Vision for the 21st Century (CONTRIBUTED)

12:35-14:00

LUNCH BREAK and POSTER VIEWING

AFTERNOON SESSION:

PROGENITORS OF SUPERNOVAE AND GRBS (Chairperson: Jesper Sollerman)

14:00-14:25

P.A. MAZZALI

Supernovae and Gamma-ray Bursts (INVITED)

14:25-14:50

B. COBB

Recent Observations of GRB-Supernovae (INVITED)

14:50-15:10

O. BROMBERG

A direct evidence for the Collapsar model of long Gamma Ray Bursts (CONTRIBUTED)

15:10-15:30

C. THOENE

The Christmas burst GRB 101225A - a new class of GRBs? (CONTRIBUTED)

15:30-16:00

COFFEE BREAK

16:00-16:25

A. LEVAN

Constraining the Progenitors of GRBs (INVITED)

16:25-16:50

B. ZHANG

GRB Progenitor and Observational Criteria (INVITED)

16:50-17:15

S. VAN DYK

Identifying Supernova Progenitors and Constraining the Explosion Channels (INVITED)

17:15-17:35

J. BIBBY

Searching for Wolf-Rayet Stars (CONTRIBUTED)

17:35-17:55

S. HACHINGER

H and He in stripped-envelope core-collapse SNe - how much can be hidden? (CONTRIBUTED)

WEDNESDAY, 14 MARCH

MORNING SESSION:

MASS LOSS, STELLAR CORE COLLAPSE AND GRAVITATIONAL SIGNATURES (Chairperson: Massimo Della Valle)

09:00-09:25

K. KOTAKE

Cutting-edge issues in core-collapse supernova theory (INVITED)

09:25-09:45

A. WONGWATHANARAT

3D core-collapse supernova simulations: Neutron star kicks and nickel distribution (CONTRIBUTED)

09:45-10:05

T. FOGLIZZO

IAU Symposium 279 “Death of Massive Stars: Supernovae and Gamma-Ray Bursts”
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A shallow water analog for asymmetric core-collapse, and neutron star kick/spin (CONTRIBUTED)

10:05-10:25

M. TANAKA

Spectropolarimetry of Type Ibc Supernovae (CONTRIBUTED)

10:25-11:00

COFFEE BREAK

11:00-11:25

A. CORSI

Gravitational Waves from Gamma-Ray Bursts (INVITED)

11:25-11:45

A. BATTA

Core-Collapse in rotating massive stars and the production of GRBs (CONTRIBUTED)

11:45-12:05

N. SMITH

SN2010jp: A Jet-Driven Type II Supernova (CONTRIBUTED)

AFTERNOON: FREE

THURSDAY, 15 MARCH

MORNING SESSION:

ENVIRONMENTS AND HOST GALAXIES OF GRBs AND SNe (Chairperson: Annalisa De Cia)

09:00-09:25

E. LEVESQUE

Host Galaxies of Gamma-Ray Bursts (INVITED)

09:25-09:50

R. STARLING

The close environments of Gamma-Ray Bursts through X-ray observations (INVITED)

09:50-10:10

J. ANDERSON

The Local Environments of Core-Collapse SNe within Host Galaxies (CONTRIBUTED)

10:10-10:30

P. JAKOBSSON

The Optically Unbiased GRB Host (TOUGH) sample (CONTRIBUTED)

10:30-11:00

COFFEE BREAK

11:00-11:25

G. LELOUDAS

Comparison of Gamma-Ray Bursts, Supernovae and WR Stars Locations (INVITED)

11:25-11:50

P. SCHADY

Dust and Metal Column Densities in GRB Host Galaxies (INVITED)

11:50-12:10

M. MODJAZ

SNe Ibc with and without GRBs: SN Properties and Locally Measured Metallicities (CONTRIBUTED)

12:10-12:30

S. SAVAGLIO

Unveiling the fundamental properties of Gamma-Ray Burst host galaxies (CONTRIBUTED)

12:30-14:00

LUNCH BREAK and POSTER VIEWING

IAU Symposium 279 “Death of Massive Stars: Supernovae and Gamma-Ray Bursts”
(March 12 – 16, 2012, Nikko, Japan)

AFTERNOON SESSION:

MASSIVE STAR FORMATION AND COSMOLOGICAL IMPLICATIONS (Chairperson: Nobu Kawai)

- 14:00-14:25** **K. OMUKAI**
Star formation in the early universe (INVITED)
- 14:25-14:50** **A. BUNKER**
Luminosities, masses and star formation rates of high redshift galaxies with current surveys (INVITED)
- 14:50-15:10** **J. GRAHAM**
Star Formation and the Metallicity Aversion of Long-Duration Gamma-Ray Bursts (CONTRIBUTED)
- 15:10-15:30** **S. FUJIMOTO**
Nucleosynthesis in neutrino-driven, aspherical Population III supernovae (CONTRIBUTED)
- 15:30-16:00**
COFFEE BREAK
- 16:00-16:25** **T. TOTANI**
Gamma-Ray Bursts as Cosmological Probes (INVITED)
- 16:25-16:50** **F. MIRABEL**
Stellar Black Holes at the Dawn of the Universe (INVITED)
- 16:50-17:10** **L. AMATI**
Measuring Cosmological Parameters with GRBs: Status and Perspective (CONTRIBUTED)
- 17:10-17:30** **M.G. DAINOTTI**
A luminosity - time correlation for gamma ray burst afterglows (CONTRIBUTED)
- 17:30-19:30**
Poster viewing Session

19:30-21:30 BANQUET

FRIDAY, 16 MARCH

MORNING SESSION:

SN EARLY EMISSION, ANISOTROPIES & PAIR-INSTABILITY (Chairperson: Roni Waldman)

- 09:00-09:25** **A. GAL-YAM**
Pair-Instability Supernovae: Observational Evidence (INVITED)
- 09:25-09:50** **K. MAEDA**
Asymmetries in Supernovae (INVITED)
- 09:50-10:10** **P. CHARDONNET**
ON PAIR INSTABILITY SUPERNOVAE AND GAMMA-RAY BURSTS (CONTRIBUTED)
- 10:10-10:30** **D. WHALEN**
Finding the First Cosmic Explosions (CONTRIBUTED)
- 10:30-11:00**
COFFEE BREAK
- 11:00-11:25** **B. KATZ**
Supernova shock breakouts (INVITED)
- 11:25-11:45** **E. NAKAR**

IAU Symposium 279 “Death of Massive Stars: Supernovae and Gamma-Ray Bursts”
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Relativistic and Newtonian shock breakouts (CONTRIBUTED)

11:45-12:05

A. SUZUKI

Probing Explosion Geometry of Core-Collapse SNe with light curves of shock breakout (CONTRIBUTED)

12:05-12:25

I. RABINAK

The early emission from SNe (CONTRIBUTED)

12:25-14:00

LUNCH BREAK

AFTERNOON SESSION:

GAMMA-RAY BURST DEMOGRAPHICS AND JET PHYSICS (Chairperson: Johan Fynbo)

14:00-14:25

A.I. MACFADYEN

The Dynamics and Radiation of Relativistic Flows from Massive Stars (INVITED)

14:25-14:50

N. BUCCIANTINI

Magnetars and Gamma-Ray Bursts (INVITED)

14:50-15:10

P. O'BRIEN

Are short GRBs powered by Magnetars? (CONTRIBUTED)

15:10-15:30

K. IOKA

Population III Gamma-Ray Burst (CONTRIBUTED)

15:30-16:00

COFFEE BREAK

16:00-16:20

B. METZGER

The Proto-Magnetar Model for GRBs (CONTRIBUTED)

16:20-16:40

Y. SEKIGUCHI

Formation & Evolution of Black Hole & Accretion Disk in Collapse of massive stellar cores (CONTRIBUTED)

16:40-17:10

S.R. KULKARNI

Conference Summary (INVITED)

END OF CONFERENCE

IAU Symposium 279 “Death of Massive Stars: Supernovae and Gamma-Ray Bursts”
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List of Participants

IAU Symposium 279 “Death of Massive Stars: Supernovae and Gamma-Ray Bursts”
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Name	Present	Affiliation
Dr. Lorenzo Amati	oral	INAF - IASF Bologna
Dr. Joseph Anderson	oral	Universidad de Chile
Mr. Yu Aoki	poster	Tokyo Institute of Technology
Mr. Iair Arcavi	oral	Weizmann Institute of Science
Dr. Katsuaki Asano	poster	Tokyo Institute of Technology
Mr. Tri L. Astraatmadja	poster	Nikhef Amsterdam
Mr. Andrey Baranov	poster	LAPTH, Universite de Savoie
Mr. Aldo Batta	oral	IA UNAM
Prof. Franz Bauer	poster	Pontificia Universidad Catolica de Chile / STScI
Mr. Sagi Ben-Ami	poster	Weizmann Institute of Science
Dr. Melina Bersten	oral	IPMU
Dr. Joanne Bibby	oral	American Museum of Natural History
Dr. Omer Bromberg	oral	The Hebrew University of Jerusalem
Dr. Niccolo' Bucciantini	invited	INAF Osservatorio di Arcetri
Dr. Andrew Bunker	invited	University of Oxford
Prof. David Burrows	oral	Penn State University
Dr. Alberto J. Castro-Tirado	invited	IAA-CSIC
Mr. Sayan Chakraborti	oral	Tata Institute of Fundamental Research
Prof. Pascal Chardonnet	oral	University de Savoie
Dr. Ryan Chornock	oral	Harvard-Smithsonian Center for Astrophysics
Dr. Bethany Cobb	invited	George Washington University
Dr. Alessandra Corsi	invited	California Institute of Technology
Dr. Sean Couch	poster	University of Chicago
Prof. Paul Crowther	invited	University of Sheffield
Dr. Maria Dainotti	oral	Stanford University
Dr. Annalisa De Cia	poster	University of Iceland
Prof. Massimo Della Valle	none	INAF-Naples
Mr. Takahiro Enomoto	none	Tokyo Institute of Technology
Prof. Romanus Eze	poster	JAXA/ISAS
Dr. Thierry Foglizzo	oral	CEA-Saclay
Dr. Gaston Folatelli	poster	IPMU, University of Tokyo
Dr. Shin-ichiro Fujimoto	oral	Kumamoto National College of Technology
Mr. Shun Furusawa	poster	Waseda University
Prof. Johan Fynbo	none	Dark Cosmology Centre
Prof. Avishay Gal-Yam	invited	Weizmann Institute of Science
Dr. Viktoriya Giryanskaya	poster	Institute of Nuclear Physics, Tashkent, Uzbekistan
Mr. Tomer Goldfriend	poster	The Hebrew University of Jerusalem
Mr. John Graham	oral	STScI & Johns Hopkins University
Dr. Stephan Hachinger	oral	INAF - Osservatorio Astronomico di Padova
Dr. Paul Hancock	none	The University of Sydney
Dr. Tetsuya Hashimoto	poster	National Astronomical Observatory of Japan
Ms. Mayumi Hayashi	none	Tokyo Tech.
Prof. Andrew Howell	poster	LCOGT / UCSB
Prof. Stefan Immler	invited	NASA/CRESST/GSFC
Dr. Susumu Inoue	none	University of Tokyo
Dr. Tsuyoshi Inoue	poster	Aoyama-Gakuin University
Dr. Kunihiro Ioka	oral	KEK Theory Center
Dr. Wakana Iwakami-Nakano	poster	Institute of Fluid Science, Tohoku University

IAU Symposium 279 “Death of Massive Stars: Supernovae and Gamma-Ray Bursts”
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Name	Present	Affiliation
Ms. Natsuko Izutani	poster	Univ. of Tokyo
Prof. Palli Jakobsson	oral	University of Iceland
Mr. Samuel Jones	poster	Keele University
Mr. Jun Kakuwa	poster	Hiroshima Univ.
Mr. Yasuomi Kamiya	none	University of Tokyo/IPMU
Dr. Boaz Katz	invited	Boaz Katz
Prof. Nobuyuki Kawai	invited	Tokyo Tech
Mr. Kosuke Kawakami	none	Tokyo Tech
Dr. Sylvio Klose	poster	Thueringer Landessternwarte Tautenburg, Germany
Dr. Kei Kotake	invited	NAOJ
Dr. Thomas Kruehler	invited	Dark Cosmology Centre
Prof. S Kulkarni	invited	Caltech
Mr. Hanin Kuncarayakti	poster	Institute of Astronomy, University of Tokyo
Dr. Giorgos Leloudas	invited	Dark Cosmology Centre
Dr. Marie Lemoine-Busserolle	poster	Gemini Observatory
Dr. Andrew Levan	invited	University of Warwick
Dr. Emily Levesque	invited	University of Colorado at Boulder
Dr. Amy Lien	poster	NASA/GSFC/ORAU
Prof. Heuijin Lim	poster	Ewha Womans University
Prof. Andrew MacFadyen	invited	New York University
Dr. Yoshitomo Maeda	poster	ISAS/JAXA
Dr. Keiichi Maeda	invited	IPMU, U. Tokyo
Dr. Jirong Mao	poster	Korea Astronomy and Space Science Institute
Prof. Paolo Mazzali	invited	INAF-Padova / MPA-Garching
Ms. Brittany McDonald	poster	McMaster University
Dr. Brian Metzger	oral	Princeton University
Dr. Takeo Minezaki	none	Institute of Astronomy, University of Tokyo
Dr. I. Felix Mirabel	invited	IAFE-CONICET & CEA-IRFU
Dr. Akira Mizuta	poster	KEK
Prof. Maryam Modjaz	oral	New York University
Dr. Sergey Moiseenko	poster	Space Research Institute
Dr. Thierry Montmerle	oral	Institut d'Astrophysique de Paris
Dr. Mikio Morii	poster	Tokyo Institute of Technology
Mr. Takashi Moriya	oral	IPMU, University of Tokyo
Dr. Nidia Morrell	poster	Las Campanas Observatory
Dr. Hiroki Nagakura	poster	Kyoto University and Waseda University
Dr. Yujin Nakagawa	poster	Waseda University
Dr. Ko Nakamura	poster	National Astronomical Observatory of Japan
Dr. Ehud Nakar	oral	Tel Aviv University
Dr. Ken'ichiro Nakazato	poster	Tokyo University of Science
Ms. A. M. Nicuesa Guelbenzu	poster	Thueringer Landessternwarte Tautenburg
Dr. Yuu Niino	poster	NAOJ
Dr. Kenichi Nishikawa	poster	UAH/CSPAR
Prof. Ken'ichi Nomoto	invited	IPMU, University of Tokyo
Dr. Takaya Nozawa	poster	IPMU, University of Tokyo
Prof. Paul O'Brien	oral	University of Leicester
Mr. Evan O'Connor	poster	California Institute of Technology
Mr. Felipe Olivares	poster	Max-Planck-Institute for extraterrestrial Physics

IAU Symposium 279 “Death of Massive Stars: Supernovae and Gamma-Ray Bursts”
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Name	Present	Affiliation
Prof. Kazu Omukai	invited	Kyoto U.
Mr. Oded Papish	poster	Technion
Dr. Daniel Perley	poster	Caltech
Prof. Elena Pian	none	Scuola Normale Superiore di Pisa
Dr. Graziella Pizzichini	poster	IASF/INAF
Dr. Antonio de Ugarte Postigo	poster	IAA-CSIC, DARK-NBI
Mr. Tyler Pritchard	poster	Penn State University
Dr. Robert Quimby	oral	IPMU
Dr. Itay Rabinak	oral	Weizmann Institute of Science
Dr. Jakub Ripa	poster	Ewha Womans University, Seoul, Korea
Dr. Pete Roming	none	SwRI
Dr. Yoshihiko Saito	poster	Tokyo Institute of Technology
Dr. Takanori Sakamoto	invited	NASA/CRESST/GSFC
Mr. Nir Sapir	poster	Weizmann Institute of Science
Dr. Sandra Savaglio	oral	Max-Planck Institute f. Extraterrestrial Physics
Dr. Patricia Schady	invited	MPE
Dr. Yuichiro Sekiguchi	oral	Yukawa Institute for Theoretical Physics
Dr. Motoko Serino	poster	RIKEN
Mr. Sanshiro Shibata	poster	Konan University
Mr. Joshua Shiode	poster	UC Berkeley
Mr. Brendan Sinnott	poster	McMaster University
Mr. Michael Smith	poster	ESAC / Vega Space
Prof. Nathan Smith	oral	U. Arizona
Prof. Jesper Sollerman	none	Stockholm University
Mr. Seongdeng Song	none	Tokyo Institute of Technology
Dr. Rhaana Starling	invited	University of Leicester, UK
Prof. Christopher Stockdale	poster	Marquette University
Dr. Kohsuke Sumiyoshi	poster	Numazu College of Technology
Dr. Yudai Suwa	poster	Kyoto University
Mr. Akihiro Suzuki	oral	University of Tokyo
Mr. Gilad Svirski	poster	Tel Aviv University
Mr. Tamas Szalai	poster	University of Szeged
Mr. Francesco Taddia	poster	Stockholm University
Mr. Koh Takahashi	poster	University of Tokyo
Dr. Hiroyuki Takahashi	poster	National Astronomical Observatory of Japan
Dr. Tomoya Takiwaki	poster	National Astronomical Observatory of Japan
Dr. Masaomi Tanaka	oral	National Astronomical Observatory of Japan
Prof. Makoto Tashiro	poster	Saitama University
Dr. Christina Thoene	oral	IAA Granada
Mr. Takahiro Toizumi	poster	Tokyo Institute of Technology
Mr. Kazuki Tokoyoda	none	Tokyo Institute of Technology
Dr. Nozomu Tominaga	poster	Konan University
Dr. Tomonori Totani	invited	Dept. Astronomy, Kyoto University
Ms. Rachel Tunnicliffe	poster	University of Warwick
Mr. Ryuichi Usui	none	Tokyo Institute of Technology
Dr. Schuyler Van Dyk	invited	Spitzer Science Center/Caltech
Prof. Nicolas Vasquez	poster	Observatorio Astronomico de Quito
Dr. Jorick Vink	oral	Armagh Observatory

IAU Symposium 279 “Death of Massive Stars: Supernovae and Gamma-Ray Bursts”
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Name	Present	Affiliation
Dr. Roni Waldman	poster	Hebrew University
Mr. Joseph Walmswell	poster	Institute of Astronomy, University of Cambridge
Dr. Daniel Whalen	oral	Carnegie Mellon University
Dr. Annap Wongwathanarat	oral	Max-Planck Institute for Astrophysics
Dr. Chao WU	poster	NAOC, CAS
Prof. Shoichi Yamada	none	Waseda University
Dr. Kazutaka Yamaoka	poster	Aoyama Gakuin University
Prof. Ryo Yamazaki	none	Aoyama Gakuin University
Dr. Yoichi Yatsu	poster	Tokyo Institute of Technology
Prof. Daisuke Yonetoku	poster	Kanazawa University
Dr. Takashi Yoshida	poster	University of Tokyo
Prof. Patrick Young	poster	Arizona State University
Ms. Norhasliza Yusof	poster	University of Malaya
Prof. Bing Zhang	invited	University of Nevada Las Vegas

Distributions by Gender and Country

Gender	Total	Percentage
Female	25	15.8%
Male	133	84.2%

Country Represented	Total	Percentage
Argentina	1	0.6%
Australia	1	0.6%
Canada	2	1.3%
Chile	1	0.6%
China	1	0.6%
Denmark	3	1.9%
Ecuador	1	0.6%
France	4	2.5%
Germany	7	4.4%
Hungary	1	0.6%
Iceland	2	1.3%
India	1	0.6%
Israel	11	7.0%
Italy	6	3.8%
Japan	60	38.2%
Korea	3	1.9%
Malaysia	1	0.6%
Mexico	1	0.6%
Netherlands	1	0.6%
Russia	1	0.6%
Spain	4	2.5%
Sweden	2	1.3%
United Kingdom	9	5.7%
United States of America	32	20.4%
Uzbekistan	1	0.6%

Scientific Highlights of the Meeting

IAU Symposium 279 “Death of Massive Stars: Supernovae and Gamma-Ray Bursts” (March 12 – 16, 2012, Nikko, Japan)

Overview

IAU Symposium 279 took place in Nikko, in the Tochigi Prefecture of Japan. The symposium was originally scheduled for the week of 18-April-2011, but was postponed due to the catastrophic earthquake, the largest in Japanese history, that hit northern Japan on 11-March-2011. The Tochigi Prefecture is located next to the Fukushima Prefecture, the same location as the Fukushima Daiichi nuclear power plant. Due to the radiation, power grid, and other infrastructure uncertainties, it was decided to postpone the meeting until the following year (although no later than 31-March-2012 in order to benefit from the generous funding provided by the Japanese government to support this meeting). The IAU Executive Committee graciously endorsed and supported the decision. When the meeting was finally held, a moment of silence was observed at the beginning of the meeting for the 20,000 individuals who lost their lives, either to the earthquake, tsunami, or the devastating aftermath.

The science motivation for holding IAU Symposium 279 centers around the death of stars that are larger than eight solar masses. These massive stars end their lives in a fiery explosion and are manifest as core collapse supernovae (CCSNe) or gamma-ray bursts (GRBs). In rare cases, a highly stripped massive star explodes and exhibits properties of both CCSNe and GRBs. In contrast, there are clear cases in which no bright supernova is found to be associated with a GRB, and vice versa. The quest in understanding supernovae (SNe) and GRBs, and the connection between them, has raised many questions. Since the elements synthesized in the explosion of massive stars are the building blocks for much of the visible Universe, it is important to understand the life cycle of these massive stars.

This symposium brought together international leaders, in both theory and observation, who study CCSNe and GRBs to discuss the range of activities in the field. These activities include: stellar evolution and explosion; progenitors, environments, and hosts; astroparticle physics; as well as multiwavelength observations of these objects and their use as cosmological probes, particularly in the very early Universe.

The symposium was divided into eight sessions, 62 talks, and 82 posters. The 158 participants came from 25 countries with 28 invited and 34 contributed speakers, of which five and six were women, respectively. We had the privilege of having with us for the whole meeting, Thierry Montmerle, Assistant General Secretary of the IAU Executive Committee, who also delivered a talk on the future organization of the IAU.

Scientific Highlights

Our understanding of the lives and death of stars with masses greater than eight solar masses are beginning to expand thanks to increasingly powerful diagnostic tools, models, and numerical simulations that have become available. These resources are helping identify the evolutionary channels and eventual fates of massive stars, as well as investigating how a fraction of them are able to produce high-energy emission and jets. The talks during the meeting focused on twelve primary themes:

- What are the differing models relating to the death of massive stars telling us
- X-ray and optical properties of all classes of SNe including superluminous SNe (sometimes referred to as “Quimbies”)

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- What we are learning from X-ray, optical, and near-IR observations of the prompt and afterglow phases of GRBs
- What we are learning from X-ray, UV, and optical observations of SNe and their remnants
- The challenges associated with observing and constraining the progenitors of GRBs and SNe
- Current thoughts on CCSNe theory
- Gravitational waves and GRBs
- Host galaxies and the local environment, particularly the metallicities, of GRBs and CCSNe
- Current theories in early Universe star formation including Population III stars
- Using GRBs as probes of the early Universe
- Understanding the shock break out of SNe
- The possible connection between short GRBs and magnetars

The symposium was concluded by Shri Kulkarni, who summarized the content of the meeting as well as included some of his own thoughts about our current understanding in the field. One invited talk was not given; Chris Fryer had a last minute emergency that prevented him from giving his talk on Stellar Collapse and GRB Explosion Mechanisms.

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List of IAU Grant Recipients

IAU Symposium 279 “Death of Massive Stars: Supernovae and Gamma-Ray Bursts”
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Recipient	Gender	Country	Amount (in Euro)*
Batta, Aldo	M	Mexico	1550
Chakraborti, Sayan	M	India	1550
Crowther, Paul	M	United Kingdom	300
Dainotti, Maria	F	United States	1325
De Cia, Annalisa	F	Iceland	1000
Giryanskaya, Viktoriya	F	Uzbekistan	1550
Leloudas, Giorgos	M	Denmark	1500
Mao, Jirong	M	Korea	800
Mirabel, Felix	M	Argentina	1000
Moiseenko, Sergey	M	Russia	1175
Papish, Oded	M	Israel	500
Ripa, Jakub	M	Korea	700
Schady, Patricia	F	Germany	1450
Starling, Rhaana	F	United Kingdom	1550
Szalai, Tamas	M	Hungary	600
Wongwathanarat, Annop	M	Germany	800
Yusof, Norhasliza	F	Malaysia	1550

*Assumed exchange rate is 112.9 JPY/Euro.

IAU Symposium No 287 (Stellenbosch South Africa)

Post Meeting Report

1. **IAU Symposium number:** 287
2. **Title of meeting** Cosmic Masers: from OH to H₀
3. **Dedicated to :** Yolanda Gómez who passed away 16 February
4. **Location** Wallenberg Conference Centre, Stellenbosch, South Africa
5. **Date of Meeting** 29 January – 3 February, 2012

6. Scientific Organising Committee:

Roy Booth (Chair)	South Africa
Wouter Vlemmings (co-Chair)	Sweden
Elizabeth Humphreys (co Chair)	Germany
Anna Bartkiewicz	Poland
Valentin Bujarrabal	Spain
Jessica Chapman	Australia
Moshe Elitzur	USA
Simon Ellingson	Australia
Yolanda Gómez	Mexico
Malcolm Gray	UK
Mareki Honma	Japan
Athol Kembal	USA
Kee-Tae Kim	Korea
James Moran	USA
Huib van Langevelde	Netherlands

7. Local Organising Committee:

Roy Booth (co-Chair)
Sharmila Goedhart (co-Chair)
Kim de Boer
Simon Fishley
Michael Gaylard
Rose Hames
Nadeem Oozeer
Sean Passmoor
Anna Schroeder
Johan van der Waalt
Patricia Whitelock

8. **Number of participants:** 123 (25 IAU grants)

9. **Countries represented** 18

Australia (9), Chile (1), China (7), France (1), Germany (17),
India (2), Italy (2), Japan (16), Korea (4), Mexico (3),
Poland (2), Russia (6), South Africa (13), Spain (4), Sweden (4)
Netherlands (5), UK (5), USA (22)

Scientific highlights

Since their discovery in 1965, cosmic masers have proved to be a valuable tool in Astrophysics, Astrometry and, more recently, Cosmology despite remaining something of an enigma in terms of the complete comprehension of their excitation mechanism and the physics of the pump source. The papers of the opening theory session reminded us of this problem but presented some new clues. Furthermore, a review of recent polarization measurements (session 2) of the Zeeman splitting of the lines added valuable new data on the role of magnetic fields.

Of special interest were several papers on the polarization of masers associated with evolved stars, which appear to enhance the hypothesis that magnetic fields play a role in answering the puzzle posed by the formation of bipolar planetary nebulae from the circularly symmetric AGB stars.

Session 3 on Masers associated with star formation began with a review of variability in (Class II) methanol masers. The quasi-sinusoidal temporal variability, first observed at the Hartebeesthoek Radio Astronomy Observatory in South Africa, remains difficult to explain but variability in either the pump source or the background continuum have been proposed. Other maser variability, intermittent and bursting was also discussed.

Nearly all the papers in the Star Formation session were on methanol class I or II. Class II methanol masers are known to be associated with young stellar objects (YSOs) and are tracers of high-mass star formation, along with OH and H₂O masers, while Class I masers (eg at 36 and 44 GHz) are found in regions of both high- and low-mass star formation with pumping dominated by collisions (with molecular hydrogen). A review of new Australia Telescope Compact Array observations of class I methanol from all transitions from 9.9 to 104 GHz

suggested that the shocks responsible for the class I masers could arise from a range of phenomena and not only the more established outflow scenario.

Progress in studies of circumstellar masers was the topic of the next session. Such emission arises from SiO and H₂O in or near the stellar photosphere, or OH in the expanding envelope. An exciting development here is coordinated mid infrared VLTI observations with the SiO radio spectroscopic VLBI observations with the VLBA. SiO masers lie in the extended atmosphere, as seen by infrared interferometry, possibly located with Al₂O₃ dust. Near-IR interferometry indicates a clumpy morphology, consistent with the erratic temporal structural changes found in VLBA observations of SiO.

There has been a lot interest in extragalactic masers in the past decade. Not only may strong water mega-masers be used to measure the Hubble constant, H₀, as a function of red-shift, they also enable the determination of the central black-hole mass.

The GBT and extremely wide band JVLA are becoming important instruments for the study of extra-galactic masers.

Some of the new instruments under discussion, even construction, have deep HI surveys as prime science drivers (MeerKAT, ASKAP, SKA). The ability of OH maser emission to confuse HI fields is a recognized problem and we heard how progress is being made in investigations of the properties of red-shifted OH, in order to deal with such problems.

Finally, maser astrometry of the Galaxy is gaining new strengths with the new interferometers VLBA, the Japanese Vera network (and its extension with the new Korean multi-frequency array), and the EVN.

It seems clear that through the work already done and that to come, maser astrometry will re-define the distance to the Galactic Centre and other established constants in astrometry.

Final comments

The fourth IAU Symposium on Astronomical masers, IAUS 287, entitled Cosmic Masers- from OH to H₀ was the second IAU symposium held in South Africa. The venue was the excellent Wallenberg Conference Centre in the beautiful old town of Stellenbosch nestling in the foothills of one of the country's foremost wine districts. The weather was perfect!

Despite a strenuous programme with lively discussions, the participants found time to visit the Cape Town Water Front and take a boat trip to historical Robben Island, where the present political structure was formulated in the mid 90s. They also enjoyed an African evening at a local hospice, where they sampled truly African food, song and dance.

We look forward to the next maser meeting, in another exotic venue, in another continent, in 4 years time.

IAU SYMPOSIUM 287: COSMIC MASERS: FROM OH TO H₀

Stellenbosch, South Africa, 29 January – 3 February, 2012

Scientific Programme

Sunday, 29th January

1800 – 2100 **Reception and initial registration**

Monday 30th January

0900 – 0915 **Welcome by Dr. Bernie Fanaroff, Director, SA SKA Project**

T1: Advances in Maser Theory

0915-1000	Vladimir Strel'nitski	(review)
1000-1025	Andrey Sobolev (I)	Computational modeling of molecular masers
1025-1045	Malcolm Gray	A detailed pumping scheme for the 1720-MHz OH maser in SNRs

Coffee break

T2: Polarization and magnetic fields

1115-1200	Wouter Vlemmings	(review)
1200-1225	Anuj Sarma	Polarization of Class I methanol masers

Lunch break

1400-1415	Clemens Thum	The polarization of the recombination line maser in MWC349
1415-1430	Nikta Amiri	Magnetic fields and developing asymmetries in the circum- stellar envelopes of evolved stars
1430-1445	Pawel Wolak	Polarization properties of OH masers in AGB and post-AGB stars
1445-1500	Andres Perez Sanchez	Maser polarization observed with ALMA
1500-1515	Gabriele Surcis	High resolution magnetic field measurements in high-mass starforming regions
1515-1530	Felipe de Oliveira Alves	First magnetic field determination at very high densities near a low-mass protostar

Coffee break

T3a: Star formation

1600-1625	Sharmila Goedhart	Maser variability in massive star forming regions
1625-1640	Nishant Singh	Binary systems: implications of outflows and periodicities
1640-1655	Kazuhito Kotogi	Intermittent maser flare around the high-mass young stellar object G353.273+0.641
1655-1710	Tomoya Hirota	VERA observations of the H ₂ O maser burst in Orion KL

1710-1800 **Poster session 1**

Tuesday 31 January

T3b: Star formation masers

0900-0945	Anna Bartkiewicz	(review, to be presented by Huib van Langevelde)
0945-1010	Claudia Cyganowski (I)	Masers in GLIMPSE Extended Green Objects
1010-1035	Stan Kurtz (I)	44 GHz methanol maser surveys

Coffee break

1100-1115	James Okwe Chibueze	A high-collimated water maser bipolar outflow in the Cepheus A HW3d massive protostellar object
1115-1130	Karl Johan Erik Torstensson	Methanol masers and millimetre lines: a common origin in protostellar envelopes
1130-1145	James De Buizer	The infrared environment of methanol maser rings at high resolution
1145-1200	Shari Breen	Masers as evolutionary tracers of high-mass star formation
1200-1215	Sergei Kalenskii	Class I methanol masers in low-mass star formation regions

Lunch break

1345-1400	Lincoln Greenhill	Dynamical detection of a magnetocentrifugal wind driven by a 20 M_{sun} YSO
1400-1415	Sandra Etoke	YSO The W51 Main/South SFR complex seen through 6-GHz OH and methanol masers

T4: Stellar Masers

1415-1500	Anita Richards	(review)
1500-1525	Markus Wittkowski (I)	Radio and IR interferometry of SiO maser stars

Coffee break ≈

1600-1625	Jean-Francois Desmurs (I)	Masers during post-AGB evolution
1625-1640	Mark Claussen	Water fountain masers in pre-planetary nebulae
1640-1655	Olgar Suarez	The first water fountain detected in a planetary nebula at 43 GHz
1655-1710	Khudhair Abbas Al- Muntafki	SiO maser morphology and polarization properties in R Cassiopeiae
1710-1725	Ionnis Gonidakis	Final, 112-frame movie of the 43 GHz SiO masers around the Mira variable TX Cam
1725-1740	William Cotton	High-resolution radio and IR observations of AGB stars

Wednesday, 1st February

T5: Maser Surveys

0900-0945	Shuji Deguchi	(review)
0945-1010	Andrew Walsh	The HOPS survey
1010-1025	Anita Titmarsh	22 MHz water maser follow-up of the southern methanol multibeam survey

Coffee break

T6: Cosmology and the Hubble Constant

1100-1145	Christian Henkel	(review)
1145-1200	Liz Humphreys	NGC 4258: The final chapter
1200-1215	Violette Impellizzeri	The mega-maser cosmology project - a new distance to Mrk 1419
1215-1230	Ingyin Zaw	Optical properties of host galaxies of extragalactic nuclear water masers

Afternoon free for outing and other activities

Thursday 2 February

T7: AGN and Mega-masers

0900-0945	Andrea Tarchi	(review)
0945-1010	Jeremy Darling (I)	Masers in starburst galaxies
1010-1025	Paola Castangia	Long term Arecibo monitoring of the water megamaser in MG J0414+0534

Coffee break

1110-1115	Kyle Willett	New surveys for OH masers: from Andromeda out to $z = 1$
1115-1130	Jiangshui Zhang	Nuclear H ₂ O masers: radio continuum and maser emission
1100-1145	Willem Baan	Formaldehyde - the other megamaser molecule

1145-1215 **Poster session IIa**

Lunch break

1345-1415 **Poster session IIb**

T8: Maser Astrometry

1415-1500	Mark Reid	(review)
1500-1525	Ye Xu (I)	Methanol maser astrometry

Coffee break

1600-1625	Jose-Maria Torrelles (I)	Kinematics of MASERS in massive star forming regions
1625-1645	Mareki Honma	Maser astrometry with VERA and Galactic structure
1645-1700	Takumi Nagayama	Astrometry of Galactic star-forming regions ON1 and ON2N with VERA
1700-1715	Ye Xu	VLBI maser kinematics in high-mass SFRs: G23.01-0.41
1715-1730	Alberto Sanna	Infall and outflow within 400 AU from a high-mass protostar: AFLG 5142
1730-1745	Ciriaco Goddi	Trigonometric parallax of the protoplanetary nebula OH 231.8+4.2

1930

Conference dinner

Friday 3 February

T9: New masers and further developments in Maser physics

0900-0945	Karl Menten	(review)
0945-1010	Maxim Voronkov (I)	New class I methanol masers
1010-1035	Mark Wardle (I)	SNR masers

Coffee break

1100-1115	Lorant Sjouwerman	Class I methanol masers in the Galactic Center
1115-1130	Izaskun Jimenez-Serra	Search for Radio Recombination Line maser objects: new detections with the SMA
1130-1145	Alejandro Báez Rubio	Unveiling the kinematics of the ionized stellar wind of the massive star MWC349A through RRL masers
1145-1200	Tanmoy Laskar	Intrinsic sizes of the W3(OH) masers via short time-scale variability
1200-1215	Avinash Deshpande	OH masers sources in W49N: probing differential anisotropic scattering with Zeeman pairs

1215-1245 **Final poster session**

Lunch break

T10: Masers and the impact of new facilities

1400-1445	Al Wooten	(review)
1445-1500	Roy Booth	Maser observations with MeerKAT
1500-1515	Kee-Tae Kim	Korean VLBI Network single dish water and methanol maser line survey of Galactic YSOs
1515-1530	Michele Pestalozzi	Methanol masers in the Herschel era
1530-1545	Crystal Brogan	Methanol and ammonia masers in massive protostars

Coffee break

1615-1700 Karl Menten **Conference Summary**

End of symposium

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