International Astronomical Union
Union Astronomique Internationale

POST MEETING REPORT FORM

1. **Meeting Identification Number:** Symposium 402
2. **Meeting Title:** Massive Stars Across Redshifts in the Era of JWST and Large Surveys
3. **Coordinating Division:** Division G Stars and Stellar Physics
4. **Dedication of meeting (if any):**
5. **Location (city, country):** Ensenada, Baja California, Mexico
6. **Dates of meeting:** 2025 September 15 - 19
7. **Number of participants:** 124
8. **Total Amount of IAU Grant funds received (in euros):** 20,000
9. **Number of IAU Grant recipients:** 25
10. **List of represented countries:** 27 / Canada, USA, Mexico, Costa Rica, Brazil, Chile, Austria, Belgium, Czech Republic, Estonia, France, Germany, Greece, Israel, Kazakhstan, Spain, Sweeden, Switzerland, UK,, China, Hong Kong, India, Japan, South Korea, Vietnam, Australia, South Africa
11. **Anticipated number of separate papers in the proceedings:** 70
12. **Report submitted by:** Aida Wofford
13. **Date and place:** October 2025, Ensenada, B.C., Mexico
14. **Signature of SOC Chairperson:** 

Summary of IAU Symposium 402: Massive Stars Across Redshifts in the Era of JWST and Large Surveys

Date: 2025 September 15 - 19

Venue: Hotel Coral y Marina, Ensenada, Baja California, Mexico

Coordinating IAU Division: Division G “Stars and Stellar Physics” and their G2 “Massive Stars Commission”

Supporting IAU Divisions: Division J “Galaxies and Cosmology”, Division H “Interstellar Matter and Local Universe”

Scientific Organizing Committee (Female 8 / Male 8; 6 continents):

Name	**Affiliation**	**Country**	**Gender**
Aida Wofford	Universidad Nacional Autónoma de México (chair)	Mexico	She
Nicole St Louis	Université de Montréal (co-chair)	Canada	She
Miriam García García	Centro de Astrobiología, CSIC-INTA (co-chair)	Spain	She
Sharzrene Mohamed	South African Astronomical Observatory	South Africa	She
Jan Eldridge	University of Auckland	New Zealand	She
Paula Benaglia	Instituto Argentino de Radioastronomía	Argentina	She
Lidia Oskinova	University of Potsdam	Germany	She
Conny Aerts	KU Leuven	Belgium	She
Sergio Simón-Díaz	Instituto de Astrofísica de Canarias	Spain	He
Georges Meynet	University of Geneva	Switzerland	He
Alexander Heger	Monash University	Australia	He
Bernhard Mueller	Monash University	Australia	He
Jorick Vink	Armagh Observatory	Ireland	He
Taeho Ryu	Max Planck Institute for Astrophysics	Rep. of Korea	He
Daniel Stark	Steward Observatory	United States	He
Michel Curé	Universidad de Valparaíso	Chile	He

Local Organizing Committee (Female 5 / Male 10):

Name	**Affiliation**	**Country**	**Gender**
Aida Wofford	Universidad Nacional Autónoma de México (chair)	Mexico	She
Carlos Román Zúñiga	Universidad Nacional Autónoma de México (co-chair)	Mexico	He
Alberto López	Universidad Nacional Autónoma de México	Mexico	He
Guillermo García Segura	Universidad Nacional Autónoma de México	Mexico	He
Sergei Jarikov	Universidad Nacional Autónoma de México	México	He
Julio Ramírez Vélez	Universidad Nacional Autónoma de México	Mexico	He

Ángeles Pérez Villegas	Universidad Nacional Autónoma de México	México	She
Alma Maciel	Universidad Nacional Autónoma de México	Mexico	She
María Eugenia García	Universidad Nacional Autónoma de México	México	She
Abisai Lucero	Dolly	Mexico	He
Manuel Núñez	Universidad Nacional Autónoma de México	México	He
José Alberto Calderon	Universidad Nacional Autónoma de México	Mexico	He
Erica Lugo	Universidad Nacional Autónoma de México	México	She
Ricardo López Valdivia	Universidad Nacional Autónoma de México	Mexico	He
Edilberto Sánchez	Universidad Nacional Autónoma de México	México	He

Support staff (students) (Female 5 / Male 2):

Name	**Affiliation**	**Country**	**Gender**
Cinthia Guadalupe Hernández Díaz	Universidad Nacional Autónoma de México	Mexico	She
Itzarel Hernandez Aburto	Universidad Nacional Autónoma de México	Mexico	She
Fabiola Marquez Medez	Universidad Nacional Autónoma de México	Mexico	She
Lucia Martinez Rivas	Universidad Nacional Autónoma de México	Mexico	She
Joel Alberto García Parra	Universidad Nacional Autónoma de México	Mexico	He
Monica Alejandra Villa Durango	Universidad Nacional Autónoma de México	Mexico	She
Ricardo Ruiz Hernández	Universidad Nacional Autónoma de México	Mexico	He

(i) Final scientific programme

Talks

Mon 15, September 2025 [IAUS Science session, day 1]				
08:00-08:55	Registration			
09:00-09:15	Opening	Opening remarks	Aida Wofford	Universidad Nacional Autónoma de México
Session 1	Large surveys and key observations (chair: Nicole St-Louis)			
09:15–09:45	Overview	Open Questions in Massive Star Research across Cosmic Scales	Andreas Sander	ZAH/ARI, Universität Heidelberg, Germany
09:45–10:15	Virtual Overview	The Impact of Large Spectroscopic Surveys on Our Understanding of Massive Stars	Sergio Simón Díaz	Instituto de Astrofísica de Canarias, Spain
10:15–10:35	Invited	Gaia and massive stars: past, present, and future	Jesús Maíz Apellániz	Centro de Astrobiología, Spain
10:35–10:55	Invited	XShootU: X-Shooting ULLYSES	Frank Tramper	Centro de Astrobiología (CAB), Spain

10:55–11:30	Coffee & Posters			
11:30–11:45	Contributed	Magellanic Cloud OB stars: Efficient analysis of large spectroscopic samples using a new pipeline	Paul Crowther	University of Sheffield, United Kingdom
11:45–12:00	Contributed	The Binary Landscape of Massive Stars at Low Metallicity: Insights from the BLOeM Campaign	Jaime Villaseñor	MPIA, Germany
12:00–12:15	Virtual Contributed	Massive stars in the era of large scale spectroscopic surveys: the MEIGAS project	Sara R. Berlanas	IAC, ULL, Spain
12:15–12:30	Contributed	Per OB1: a test-bed for improving our understanding of massive stars in the large-scale surveys era	Abel de Burgos Sierra	European Southern Observatory, Chile
12:30–12:45	Contributed	Unveiling the hidden population of massive stars stripped in binaries with new UV photometry	Bethany Ludwig	KU Leuven, Belgium
12:45–13:00	Contributed	Binary OB and OBe Field Stars: The RIOTS4 Multi-Epoch RV Survey of the SMC Wing	Irene Vargas-Salazar	University of Michigan, United States
13:00–14:30	Lunch			
14:30–14:45	Contributed	Spectroscopic Surveys of Massive Stars and their Local Environment in the SDSS	Carlos Román Zúñiga	Instituto de Astronomía UNAM, Ensenada, México
Session 2	High-z stars: observed and synthetic (chair: Aida Wofford)			
14:45–15:15	Virtual Overview	Star Formation in the High-Redshift Universe	Volker Bromm	Department of Astronomy, University of Texas at Austin, USA
15:15–15:35	Virtual Invited	Early oxygen and metal enrichment at very high redshift	Ryan Sanders	University of Kentucky, USA
15:35–15:55	Virtual Invited	The ionising spectrum of galaxies: observational constraints and simulation inferences	Anne Verhamme	University of Geneva, Switzerland
15:55–16:30	Coffee & Posters			
16:30–16:45	Contributed	The Impact of Very Massive Stars on Chemical Abundances and the Detection of Population III Stars through the HeII1640 Line	Sabyasachi Goswami	IAA-CSIC, Granada, Spain
16:45–17:00	Contributed	Massive stars in high redshift galaxies - results from JWST-JADES	Andy Bunker	University of Oxford, United Kingdom
17:00–17:15	Contributed	Characterizing metal-poor massive stars in the early Universe with rest-UV-optical spectra	Allison Strom	Northwestern/CIERA, United States
17:15–17:30	Contributed	Constraining sources of high-ionization emission from high redshift to the local volume	Peter Senchyna	Carnegie Observatories, United States
17:30–17:45	Contributed	The Ionizing Sources of Pox 186 - the Best Local Analogue of Reionization Era Galaxies	Claus Leitherer	Space Telescope Science Institute, United States
17:45–18:00	Contributed	Properties of high-redshift Type II supernovae discovered by the JWST transient survey	Takashi Moriya	National Astronomical Observatory of Japan
18:00–18:15	Virtual Contributed	Massive Stars as gravitationally lensed transients – Insights on high-mass IMF	Sung Kei Li	The University of Hong Kong, China
18:30–21:30	Welcome cocktail			
Tue 16, September 2025 [IAUS Science session, day 2]				

Session 3	Stellar evolution and atmosphere models: theory (chair: Jorick Vink)			
09:00–09:30	Discussion led by session chairs			
09:30–10:00	Virtual Overview	Winds from Massive Stars across Redshifts	Jon Sundqvist	University of Uppsala, Sweden
10:00–10:20	Invited	From mass transfer to stripped stars	Pablo Marchant	Ghent University, Belgium
10:20–10:40	Invited	Single Star Evolution	Raphael Hirschi	Keele University, United Kingdom
10:40–10:55	Contributed	What's to come in the theory of model atmospheres	Nicolas Moens	Institute of Astronomy, KU Leuven, Belgium
10:55–11:10	Conference picture			
11:10–11:30	Coffee & Posters			
11:30–11:45	Contributed	Deep atmosphere models of very massive stars	Joris Josiek	ZAH/ARI, Universität Heidelberg Nijmegen, Germany
11:45–12:00	Virtual Contributed	Apsidal Motion in O-Star Binaries: Finally resolving the discrepancy between observational and theoretical internal stellar structure constants k2!	Luca Sciarini	University of Geneva, Switzerland
12:00–12:15	Contributed	Helium stars mergers as a route towards intermediate mass stripped stars	Annachiara Picco	KU Leuven, Belgium
12:15–12:30	Contributed	Emulating FASTWIND with deep neural networks: applications and first results	Michael Abdul-Masih	Instituto de Astrofisica de Canarias (IAC), Spain
12:30–12:45	Virtual Contributed	Realistic atmosphere in stellar evolution models for massive stars	Thomas Vojes	Université de Montpellier, France
Session 4	Stellar evolution and atmospheres: observations (chair: Takashi Moriya)			
12:45–13:05	Virtual Invited	Stripped Stars in Be Binaries: Observational Advances and Evolutionary Challenges	Varsha Ramachandran	University of Heidelberg, Germany
13:00–14:30	Lunch			
14:30–15:00	Overview	Analyses of OB stars: abundances and stellar parameters	Norbert Przybilla	Institut für Astro- und Teilchenphysik, Universität Innsbruck, Austria
15:00–15:20	Invited	X-ray and gamma-ray binaries	Itumeleng Monageng	University of Cape Town / South African Astronomical Observatory, South Africa
15:20–15:35	Contributed	The B[e] Phenomenon in Supergiants. A Result of Mass Transfer in Binaries, Mergers, or What?	Anatoly Miroshnichenko	University of North Carolina Greensboro, United States
15:35–15:50	Contributed	The Real Mass-loss Rates of Massive Stars: JWST-NIRSPEC enables the first constraints on thin-wind stars	Alexandre Legault	Centro de Astrobiología (CAB), Spain
15:50–16:30	Coffee & Posters			
16:30–16:45	Contributed	New Observational Insights into the Astrophysics of Extremely Metal-Poor O Stars	Grace Telford	Princeton University, United States
16:45–17:00	Contributed	Recurring Eruptions of AT 2016blu	Mojgan Aghakhanloo	University of Virginia, United States
17:00–17:15	Contributed	The dramatic transition of WOH G64, a key to understand extreme massive star evolution	Gonzalo Munoz-Sanchez	National Observatory of Athens, Greece

17:15–17:30	Contributed	Census of individual massive stars in nearby galaxies using JWST images	Divakara Mayya	INAOE, Puebla, Mexico
17:30–18:00	Discussion led by session chairs			
18:00–19:00	Poster exhibit			
Wed 17, September 2025 [IAUS Science session, day 3]				
Session 5	Asteroseismology, spectropolarimetry, interferometry (chair: Miriam García)			
09:00–09:30	Overview	Viewing stellar interiors through the lens of asteroseismology	May G. Pedersen	University of Sydney, Australia
09:30–10:00	Virtual Overview	The origin and impact of stellar magnetic fields tackled with spectropolarimetry	Evelyne Alecian	University Grenoble Alpes, France
10:00–10:20	Invited	Massive stars seen through Interferometric Eyes	Marcelo Borges	Observatório Nacional, Brazil
10:20–10:35	Contributed	Interferometry of massive stars	Hugues Sana	KU Leuven, Belgium
10:35–10:50	Contributed	Resolving Be stars with the MAGIC + LST1 SII: gam Cas first results and future prospects	Alejo Cifuentes	CIEMAT, Spain
10:50–11:05	Contributed	How protostellar jets remove angular momentum during the formation of massive stars	André Oliva	University of Costa Rica, Costa Rica
11:05–11:35	–	Coffee & Posters	–	–
11:35–11:50	Virtual Contributed	3D macro physics of massive stars revealed from 3D stellar hydrodynamics simulations	Falk Herwig	University of Victoria, Canada
11:50–12:05	Contributed	Merger Seismology: Identifying Stellar Merger Products with Asteroseismology	Jan Henneco	Newcastle University, United Kingdom
12:05–12:20	Contributed	Linear spectropolarimetric variations across spectral lines of WR6 as a tracer of large-scale structure in its wind	Luca Fabiani	Université de Montréal, Canada
12:20–12:50	Discussion led by session chairs			
12:50–14:30	Free afternoon or meal at vineyard			
Thu 18, September 2025 [IAUS Science session, day 4]				
Session 6	Final Products of Massive Stars (chair: Hugues Sana)			
09:00–09:30	Overview	What have we learned from gravitational-waves about the lives of Massive Stars?	Floor Broekgaarden	UC San Diego, United States
09:30–09:50	Virtual Invited	Zoo of supernovae	Maryam Modjaz	NYU, United States
09:50–10:10	Virtual Invited	The modeling of magnetized core-collapse supernovae: status and perspectives	Matteo Bugli	IAP - CNRS, France
10:10–10:25	Contributed	Black Holes at low and high Z	Jorick Vink	Armagh Observatory and Planetarium, United Kingdom
10:25–10:40	Contributed	The Dynamics of Massive Stars and Compact Objects in Young Star Clusters	Kyle Kremer	UC San Diego, United States
10:40–10:55	Contributed	Robust features in the LVK chirp mass distribution from bimodal black hole masses	Reinhold Willcox	KU Leuven, Belgium
10:55–11:30	Coffee & Posters			

11:30–11:45	Virtual Contributed	Investigating chemically homogeneous evolution as a possible source of the 35 M⊙ bump	Lucas de Sá	University of São Paulo, Brazil
11:45–12:00	Virtual Contributed	Using UV Supernova Observations to Map RSG Mass Loss from Quiescent to Outburst	Azalee Bostroem	University of Arizona, United States
12:00–12:15	Contributed	Nuclear Neural Networks: Emulating Late Burning Stages in Core Collapse Supernova Progenitors	Aldana Grichener	The University of Arizona and Steward Observatory, United States
12:15–12:30	Contributed	Testing the whetstone - empirical constraints on mass transfer efficiency and stability from massive Algol binaries	Koushik Sen	University of Arizona, United States
Thu 18, September 2025 [IAUS Science session, day 4]				
Session 7	Population Synthesis Models and Feedback (chair: Claus Leitherer)			
12:30–13:00	Overview	Stellar population synthesis models including binary stars	Gustavo Bruzual	IRyA, UNAM, Campus Morelia, Mexico
13:00–14:30	Lunch			
14:30–14:50	Invited	Interacting Winds and Giant Eruptions in Massive Binaries, and their Effects on the Involved Stars	Amit Kashi	Ariel University, Israel
14:50–15:10	Invited	Nucleosynthesis and galactic chemical evolution	Chiaki Kobayashi	Centre for Astrophysics Research (CAR), University of Hertfordshire, UK
15:10–15:25	Contributed	(Very) Massive stars at low metallicity - The next generation of pyStarburst99 models	Calum Hawcroft	STScI, United States
15:25–15:40	Contributed	Photoionization models of H II regions: a grid for the next decade	Oskar Aranguré	Instituto de Astronomía UNAM, Mexico
15:40–15:55	Contributed	Finding He II: testing novel models of binary populations across cosmic time	Beryl Hovis-Afflerbach	Northwestern University/CIERA, United States
15:55–16:30	Coffee & Posters			
16:30–16:45	Contributed	Connecting individual and collective winds in stellar clusters	Cormac Larkin	ARI & MPIK, Heidelberg, Germany
16:45–17:00	Contributed	How to form (or not form) a gravitational wave source: quantifying Drake equations of compact object mergers from isolated massive binary stars	Ana Lam	CUNY Graduate Center/CCA, United States
17:00–17:30	Discussion led by session chairs			
17:30–18:00	Poster exhibit			
18:30	Conference dinner			
Fri 19, September 2025 [IAUS Science session, day 5]				
Session 8	Looking to the Future (chair: Paul Crowther)			
10:00–10:30	Virtual Overview	Looking to the future	Coralie Neiner	Observatoire de Paris, Meudon, France
10:30–10:45	Virtual Contributed	Hubble’s outlook into the 2030s and prospects for massive stars	Julia Roman Duval	Space Telescope Science Institute, USA
10:45–11:00	Virtual Contributed	Extremely Large Telescope (ELT) observations of massive stars	Miriam Garcia	Centro de Astrobiología (CSIC-INTA), Spain

11:00–11:30	Coffee & Posters			
11:30–11:45	Virtual Contributed	Progress and Insights into Massive Star Physics with the Polstar UV Spectropolarimetry Small Explorer Mission	Jeremy Drake	Lockheed Martin Solar and Astrophysics Laboratory, United States
11:45–12:00	Virtual Contributed	The CubeSPEC space mission: data simulator and observational strategy validation	Philippe Neuville	KU Leuven, Belgium
12:00–12:30	Overview	Conference Summary	Gloria Koenigsberger	Instituto de Ciencias Físicas de la UNAM, Mexico
12:30–12:45	Closing remarks by organizing committee			

Total number of talks: 72. Overview: 11 (Female 5 / Male 6). Invited: 13 (4 Female / 9 Male). Contributed: 48 (12 Female / 36 Male). Session chairs (Female 3 / Male 5). Duration of talks. Overview: 26 min (talk) + 3.5 min (questions) + 0.5 min (transition). Invited: 17 min (talk) + 2.5 min (questions) + 0.5 min (transition). Contributed: 12 min (talk) + 2.5 min (questions) + 0.5 min (transition). In addition, there were four 30 min discussions that combined two sessions each.

Posters

A Spectroscopic Survey of Metal-Poor OB Stars in Local Dwarf Galaxy NGC 3109	Abby Mintz	Princeton University	USA
Testing spectral synthesis models in the rest-frame UV with observations of nearby extremely metal-poor galaxies	Aida Wofford	Instituto de Astronomía, UNAM, Ensenada	Mexico
Linking the Ionization Hardness of Stars to the Gas in the Magellanic Clouds	Alejandra Z Lugo-Aranda	Instituto de Astronomía, UNAM, Ensenada	Mexico
Evolution of massive stars adopting new winds towards the O/WNh transition	Alex Gormaz-Matamala	Astronomical Institute of the Czech Academy of Sciences	Czech Republic
Could the Luminous Blue Variable Candidate WR 31a be a Binary?	Christi Erba	Space Telescope Science Institute	USA
The legacy value of the JWST public observations on the star-forming galaxies	Ana Luisa González Morán	Instituto Nacional de Astrofísica, Óptica y Electrónica	Mexico
Rapid and large-scale variability in macroturbulence: the case of Zeta Ophiuchi with ESPRESSO	Ankur J Kalita	Newcastle University	UK
Yellow hypergiants and where to find them	Anni Kasikov	University of Tartu, ESO	Estonia
Pioneering JWST spectroscopy of O stars in the low-metallicity young cluster NGC346	Armin Mang Román	Universität Potsdam	Germany
JWST-MIRI detection of [NeV], [NeVI] and [OIV] wind emission in late O-dwarfs	Calum Hawcroft	STScI	USA
SpecpolFlow: First Applications and Results	Christi Erba	Space Telescope Science Institute	USA
Building Galaxies from basic stones	Christophe Morisset	Instituto de Astronomía, UNAM, Ensenada	Mexico
The wind properties of O stars at sub-SMC metallicity	Ciarán Furey	Armagh Observatory	UK
Characterization of single-lined massive	Cinthya Rodriguez	Gemini Observatory	USA

binary systems			
The lack of fast rotators in Cyg OB2: Insights from spectral reclassification of its B0 population	Daniel Galán Diéguez	Instituto de Astrofísica de Canarias	Spain
Spectroscopic analysis of the OB population in the Magellanic Bridge	Elisa Schösser	ZAH/ ARI, Universität Heidelberg	Germany
Exploring the Extreme Mass Ratio of Binary Massive Stars in M17	Erin Abraham	Embry-Riddle Aeronautical University	USA
A new generation of empirical metallicity calibrations based on a comprehensive Te-based approach for local and high-z studies	Fernando Fabián Rosales-Ortega	Instituto Nacional de Astrofísica, Óptica y Electrónica	Mexico
XShootU: X-Shooting ULLYSES	Frank Tramper	Centro de Astrobiología	Spain
Can Wolf-Rayet stars be the missing ingredient to explain high-z He II ionizing radiation?	Gemma González-Torà	ZAH/ARI, Universität Heidelberg	Germany
The SMC multiple system HD5980: prototype progenitor of a low-metallicity binary black hole system	Gloria Koenigsberger	Instituto de Ciencias Físicas, UNAM, Morelos	Mexico
Magnetic field, rotation, and binarity of the first magnetic B[e] star, IRAS 17449+2320.	Iris Bermejo Lozano	Astronomical Institute of Charles University	Czech Republic
Discovery of a Magnetic Field in the O-type Bright Giant 63 Oph	James Barron	Queen's University	Canada
Mass-Dependent Orbital Period Distributions as tracers of the Pairing Mechanism of Massive Binaries	Jasmine Vrancken	KU Leuven	Belgium
Transfer learning applied in spectropolarimetric data analysis	Julio Ramírez	Instituto de Astronomía, UNAM, Ensenada	Mexico
Two Be or Not Two Be: A New Companion detection for HD 52244 using HST FGS	Keefe Kamp	Embry-Riddle Aeronautical University	USA
Modeling the Formation of Thorne-Żyktow Objects: Hydrodynamical Simulations of Neutron Star-Main Sequence Mergers	Lauryn E. Williams	University of Washington	USA
Probing Fundamental Physics with Massive Stars: Constraints on Varying Physical Constants	Le Duc Thong	Dong Nai Technology University	Vietnam
Effects of tidal shear energy dissipation on the structure of eccentric orbit stars	Leomar Maranan	Universidad Autónoma del Estado de Morelos	Mexico
How can the apsidal motion of massive binary systems be used to constrain their angular momentum transport mechanisms?	Luca Sciarini	University of Geneva	Switzerland
Pioneering JWST spectroscopy of O stars in the low-metallicity young cluster NGC346	Armin Mang Román	University of Potsdam	Germany
Variability of Southern Blue Supergiants with TESS	Michalis Kourniotis	Astronomical Institute, Czech Academy of Sciences	Czech Republic

ELT-HARMONI prospects for massive stars	Miriam García & Frank Tramper	CAB (CSIC-INTA)	Spain
The Rosette Nebula with LVM and MWM: Morphological and Kinematical Structure	Mónica Villa	Instituto de Astronomía, UNAM, Ensenada	Mexico
Near and far: Forming highly asymmetric mass-ratio X-ray binaries and gravitational wave events	Neev Shah	The University of Arizona	USA
MCRT Simulations of Light and Polarization Curves from CIRs in the Winds of Massive Stars: Application to Zeta Puppis	Nicole St-Louis	Université de Montréal	Canada
The OWN Survey: 20 years studying the multiplicity of massive stars	Nidia Morrell	Las Campanas Observatory	Chile
Newly discovered nebulae around Galactic B-type stars and their origins	Olga Maryeva	Astronomical Institute of the Czech Academy of Sciences	Czech Republic
A multiwavelength analysis of G 2.4+1.4 nebula	Palmira Jimenez	Instituto de Astronomía, UNAM, Ensenada	Mexico
A "Lite" Photometric Survey of the Magellanic Clouds	Philip Massey	Lowell Observatory	USA
Testing the bloated star hypothesis in the massive young stellar object IRAS 19520+2759	Rakesh Pandey	Institute of Radio Astronomy and Astrophysics, UNAM, Morelia	Mexico
Toward a Homogeneous Characterization of Cool and Hot Stars	Ricardo López-Valdivia	Instituto de Astronomía, UNAM, Ensenada	Mexico
One century of data of tau Canis Majoris reveals an overcontact binary and an eccentric orbit with retrograde apsidal motion	Sophie Rosu	Université de Genève	Switzerland
OB supergiants in low metallicity environments: stellar and wind properties in the region of the bistability jump.	Thaer Alkousa	The University of Sheffield	UK
IAU G2 commission activities	IAU G2	Lida Oskinova	Germany
2022-2025 obituaries of massive star colleagues	IAU G2	Guillermo García Segura	Mexico
Expanding the ALS catalogue: Incorporating the Magellanic Clouds into the study	Juan A. Molina-Calzada	Centro de Astrobiología (CSIC-INTA)	Spain
Tracing the origins of runaway Wolf-Rayet stars in the Galaxy	Jane Arthur	Institute of Radio Astronomy and Astrophysics, UNAM, Morelia	Mexico
Assessing the ionizing flux of massive star models with spatially-resolved observations of LVM and photoionization models	Oskar Aranguré	Instituto de Astronomía, UNAM, Ensenada	Mexico
*Constraining Orbital Parameters of Massive Binaries Using Radio Data	Bharti Arora	Department of Physics and Material Science and Engineering, Jaypee Institute of Information Technology	India
*Dance to Demise -- How Massive Stars May Form Dense Circumstellar	Sutirtha Sengupta	Indian Institute of Astrophysics	India

Shells Before Explosion			
*A Census of B/A Galactic Supergiants. Refinement of the Fundamental Parameters.	Nadezhda Vaidman	Al-Farabi Kazakh National University	Kazakhstan
*Insights of massive stars with metallicity for nearby galaxies	Grigoris Maravelias	PeriAstron & Institute of Astrophysics, FORTH	Greece

Total number of posters: 53. In person: 49. Electronic: 4 (marked with an asterisk; enabled online participants to meet the requirement of a contribution in order to get the online registration fee reimbursed by their institutions). No poster flash talks. Scavenger hunt with three prizes instead. Prizes: Mexican Alebrijes. Poster sessions were well attended.

Poster scavenger hunt questionnaire

Your name:_____Your affiliation:_____
Your country of affiliation:_____Your subfield of expertise:_____

a) What is the question hidden in 6 of the conference posters? Answer: what/ is the/ largest / eye / in the / world?, which was written in blue capital letters next to the author list in each poster. We accepted: ELT and Event Horizon Telescope.

b) Find scientific questions addressed in three different posters [give the questions, poster numbers, subfields, countries of affiliation of the main authors] from:

- a person who works in a subfield different than yours,
- a person with an affiliation in a continent different than yours,
- a person you didn't know before the symposium.

c) What is the most interesting result presented in a poster you visited? [Give the poster number]

d) Which poster was the most didactic and why? [Give the poster number]

e) Which poster contained the most astonishing image? [Give the poster number]

f) What are three of the activities conducted by the IAU G2 commission?

g) Create a new poster title exclusively using words taken from the titles of IAUS402 posters. [Give the numbers of the posters you used, bonus points will be awarded for creativity]

(ii) Summary of the scientific highlights of the meeting

We list the eight sessions on massive stars of symposium IAUS 402 and summarize their highlights below.

S1) Large surveys and key observations
S2) High-redshift stars: observed and synthetic
S3) Stellar evolution and atmosphere models: theory
S4) Stellar evolution and atmosphere models: observations
S5) Asteroseismology, spectropolarimetry, interferometry
S6) Final products of massive stars
S7) Population synthesis models and feedback
S8) Looking to the future

S1. Observing representative samples of massive stars is important for building a general picture of the physics and evolution of these objects. In particular, their optical and UV spectra enable us to estimate their stellar and wind parameters. In this context, we heard about recent spectroscopic surveys of the Galaxy (MW) and the Magellanic Clouds (MCs) that extend or complement past work, including the SDSS-V Milky Way Mapper (OB-star component), XShootU (``single'', low-metallicity (Z) OB stars) and BloeM (low-Z binaries), among other surveys. The upcoming DR4 of Gaia should greatly enhance massive-star science in the MW by providing significantly improved massive-star parameters. We discussed the importance of updating existing infrastructure, such as the Virtual Observatory, in order to share and combine observations from complementary surveys. We also discussed the challenges faced by automated methods developed for the analyses of large samples due to the presence of binaries, microturbulence, and line profile variability.

Since crucial pieces in our picture of massive stars are still missing, purpose-designed large surveys in combination with careful inspection of star subsamples and peculiar objects are still much needed.

S2. High-redshift observations are important for testing our models of the first stars and their cosmic evolution. Observations of targets at various redshifts were presented. a) A JWST JADES observation of a z~11 target implies larger heavy-element abundances than expected in the early stages of the Universe and the presence of a strong source of FUV ionizing radiation. Very high-z observations imply efficient mixing via rotation or other processes and a top heavy stellar initial mass function (IMF). b) SN II at z~3.6 do not seem to be biased to higher luminosity, suggesting that mass loss prior to SN is not metal dependent. c) A microlensed source at z=1.49 reveals the presence of either a blue supergiant or cluster of massive stars. d) The study of local star-forming galaxy analogs, such as Pox 186, are providing clues for interpreting high-z observations of massive star populations. e) On the other hand, the origin of the strong nebular He II 1640 (or 4686 A) emission that is observed in some local galaxies is still unclear, which is a problem for interpreting observations of this key UV line for high-z studies. Finally, some of the open issues that were discussed include: the lack of observational evidence for Pop III stars, that we do not know the SED shape of the first generations of stars, and that it is unclear how to best measure the abundances of the high-z ISM.

S3 and S4. Many processes need to be considered in the physical modeling of massive stars: nuclear reactions, mass loss, convection, rotation, mixing, magnetic fields, equation of state, opacity, neutrino losses, role of metallicity... Regarding rotation, hydrodynamical models allow for differential rotation while models with magnetic fields lead to uniform rotation. The high frequency of massive-star binaries implies that we must account for interaction effects in modeling. In the context of eccentric-orbit binaries, asynchronous rotation excites oscillations that need to be considered in models. Although the modeling of massive stars seems daunting due to its complexity, comparisons of atmosphere models with high quality spectra were presented, which show progress in the modeling of spectral profiles. 3D models of stellar atmospheres were also presented.

S5. Observations are crucial to help decrease the large uncertainties in the modeling of the evolution and atmospheres of massive stars. Asteroseismology, spectropolarimetry, and interferometry were presented as powerful observational techniques to study massive stars. With asteroseismology one can deduce the internal rotation and mixing, and identify merger products. Interferometry enables us to spatially resolve binary companions and circumstellar material. Spectropolarimetry enables the study of magnetic fields, which seem to be inhibiting mixing in massive stars.

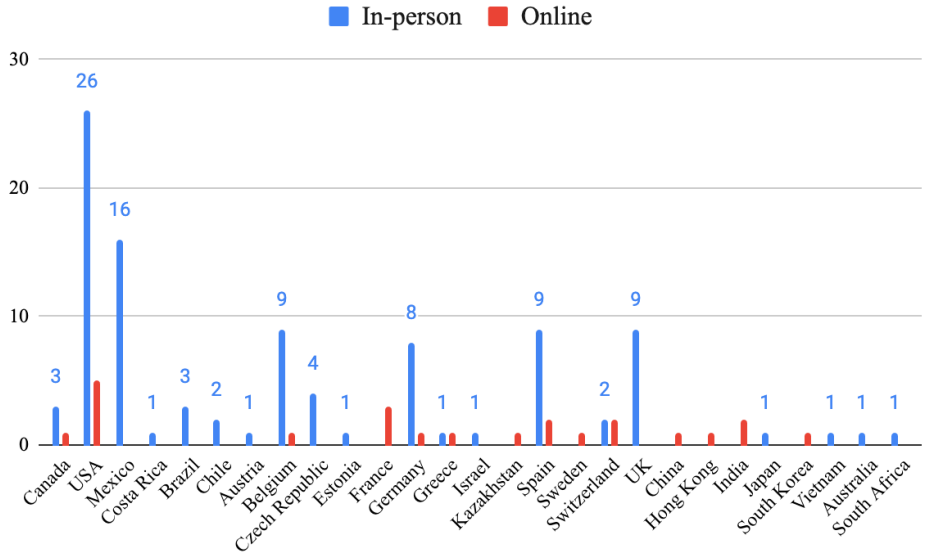
S6. The end products and explosions of massive stars can also shed light on the processes that rule their evolution. Regarding models of merging massive stars that produce gravitational waves (GW), these need as input the mass and metallicity of the star. Thus, interpretations of GW events rely on processes that are assumed important prior to the final product production (e.g., common envelope evolution, prescription and assumptions in the treatment of stellar winds) and are poorly constrained. Open questions regarding the final products of massive stars include how the shock during core collapse interacts with the stellar layers. Regarding observations of the supernova (SN) zoo some developments include obtaining pre-maximum spectra.

S7. Population synthesis models are a main tool for interpreting observations of unresolved stellar populations and their computation represents a gigantic task because of the multiple ingredients and abundant free parameters (e.g. stellar models, stellar libraries, IMF parameters, binaries and products of binary interaction) involved. Computing the parallel photoionization and dust models that are necessary for comparison with observations of young and/or dusty populations is also challenging because they rely on parameters that are not always well constrained by observations. Finally, predicting the radiative, mechanical and chemical feedback from stellar populations is also challenging because modeling individual stars is challenging, as discussed in the previous sections. Some of the processes that are not often considered in models include wind collisions in binaries and clusters, X-ray production, and accretion and outbursts processes. Models with rotation, binaries, ionized gas, and dust mixed with the ionized gas were presented.

S8. The last session was dedicated to reflecting about the future of massive star science, which is exciting. MOS on larger telescopes are being built or considered (MOSAIC/ELT), GMACS/GMT, MSE, WFOS/TMT. However, the construction of some of these MOS are threatened by funding cuts. In the seismology domain, PLATO, which has a huge FOV and sensitivity, is expected to launch in 2026. In addition, HAYDN, which is similar to KEPLER, has been proposed. Regarding spectropolarimetry in the optical + UV, in order to study the surface and environment of stars, several relevant missions are planned, including the Habitable Worlds Observatory, the Arago mission, and POLSTAR (UV). Interferometry in space is also being considered with projects like LIFE. Additionally, the ELT's first light is expected for 2028 and HST is expected to continue observations well into the 2030s given that its performance is still efficient and it is still in high demand.

(iii) List of participants

Total number of participants: 124. In-person: 97 (Female 34 / Male 63). Online: 27 (Female 12 / Male 15). Continents: 6 / (Africa, Asia, Oceania, Europe, North America, South America). Countries: 27 / Canada, USA, Mexico, Costa Rica, Brazil, Chile, Austria, Belgium, Czech Republic, Estonia, France, Germany, Greece, Israel, Kazakhstan, Spain, Sweden, Switzerland, UK, China, Hong Kong, India, Japan, South Korea, Vietnam, Australia, South Africa



(iv) List of recipients of IAU grants, stating the amount received, country and gender

First Name	Family Name	Gender	Institute of work	Country of work	Amount in Euros
Lucas	de Sá Marques dos Santos	He	Institute of Astronomy, Geophysics and Atmospheric Sciences - University of São Paulo	Brazil	$1,611
Iris	Bermejo Lozano	She	Astronomical Institute of Charles University	Czech Republic	$934
Gonzalo	Muñoz Sánchez	He	National Observatory of Athens	Greece	$1,494
Amit	Kashi	He	Ariel University	Israel	$1,751
Fabián	Rosales-Ortega	He	Instituto de Astrofísica, Óptica y Electrónica	Mexico	$1,097
Ana Luisa	Gómez Morán	She	Instituto de Astrofísica, Óptica y Electrónica	Mexico	$1,261
Le	Thong	He	Dong Nai Technology University	Vietnam	$2,127
Abel	de Burgos Sierra	He	European Southern Observatory	Chile	$490
Anni	Kasikov	She	Tartu Observatory, University of Tartu, ESO	Estonia	$444
Erin	Abraham	She	Embry-Riddle Aeronautical University	USA	$444
Bathi	Aurora	She	Pagué por adelantado los registros presencial y virtual de Le Thong y Bathi Aurora	India	$155
Ana	Lam	She	City University of New York, Graduate Center	USA	$514
Luca	Sciarini	He	University of Geneva	Switzerland	$630
Ciaran	Furey	He	Armagh Observatory	Ireland	$514
Irene	Várgas-Salazar	She	University of Michigan	USA	$514

Christi	Erba	She	Space Telescope Science Institute	USA	$514
Keefe	Kamp	He	Embry-Riddle Aeronautical University	USA	$514
Abigail	Mintz	She	Princeton University	USA	$514
Lauryn	Williams	She	University of Washington	USA	$514
Neev	Shah	He	University of Arizona	USA	$514
Sen	Koushik	He	University of Arizona	USA	$514
Frank	Tramper	He	Centro de Astrobiología (INTA - CSIC)	Spain	$747
Miriam	García	She	Centro de Astrobiología (INTA - CSIC)	Spain	$444
Norbert	Przybilla	He	Institut für Astro- und Teilchenphysik, Universität Innsbruck	Austria	$1,307
Chiaki	Kobayashi	She	Centre for Astrophysics Research (CAR), University of Hertfordshire	UK	$444

Number of recipients: 25. Female 12 / Male 13. Countries: 14. Continents: 4. Total awarded: 20,000 Euros.

(v) An Executive Summary of the Meeting

We organized IAU symposium 402 on massive stars across redshifts, which took place from September 15 (Mon) 2025 to September 19 (Fri) 2025 in Ensenada, Baja California, Mexico. All sessions were held in the large conference room of the Hotel Coral y Marina, which is located 15 minutes by car from the Ensenada bus station. In order to enhance attendance by participants in underprivileged countries and/or with parental duties, we held a hybrid meeting using the Zoom platform. The political situation at the time of the meeting affected the attendance of participants from some countries who opted for online participation. All talks were recorded, stored on a server at the hosting university (Universidad Nacional Autónoma de México), and made available to registered participants for asynchronous viewing, which mitigated the problem of differences in time zones.

Massive stars are crucial for solving multiple cosmic puzzles. This is because they are key contributors of ionizing radiation, mechanical energy, metals, cosmic rays, and dust; and when they die, they produce neutron stars, black holes, and/or gravitational waves. However, many competing factors are thought to influence their observed properties and challenge our understanding of how these stars evolve and contribute to the Universe. The Massive Stars Commission (G2) of the IAU's Stars and Stellar Physics Division regularly organizes a symposium, typically every 4 years, to present the latest research findings in the field, discuss the status of current research in massive stars, and chart the way forward for future research. The first meeting was in Argentina in 1971, and in the last decade we organized "Massive Stars: from Alpha to Omega" in Greece (2013), "IAUS 329: The Lives and Death Throes of Massive Stars" in New Zealand (2016), and "IAUS 361: Massive Stars Near and Far" in Ireland (2020, postponed to 2022 due to the pandemic).

Since the last symposium organized by the G2 commission (IAUS 361, 2022), the James Webb Space Telescope is dramatically changing our understanding of the early Universe. Many improvements have been made on individual stars, close binaries and population synthesis models. In addition, a better understanding of the impact of massive stars on their surroundings has been achieved and, in addition, analysis techniques are also increasingly sophisticated. These involve accounting for improved or more complete physics, better atomic data, and/or evolving from 1-dimensional to 3D models in the simulations of stellar structure and winds. Despite the large progress, however, outstanding open questions on massive star evolution and winds remain (e.g. the role of metallicity, true mass loss rates, internal transport mechanisms and magnetic fields to name a few). The view of massive star evolution also needs to be reconciled with the view of the massive star graveyard drawn by gravitational wave experiments. These issues, need to be solved to properly account for the role of massive stars across cosmic time, and to maximize the return of empirical datasets and models in the era of JWST and large surveys (SDSS V Mappers, SKA, and Rubin/LSST, among others). Fortunately, the field of massive stars is entering a new era also enabled by large scale spectroscopic surveys. By targeting vast samples of massive stars in the Milky Way and our neighbours the Magellanic Clouds, IACOB, WEAVE, 4MOST, SDSS IV APOGEE, RIOTS, HST-ULLYSES, and VLT-XShootU, as well as complementary observations, these surveys are enabling detailed constraints on theory obtained thanks to quantitative spectroscopic analyses. In addition, new promising research areas are consolidating, such as massive-star asteroseismology, that is providing an unprecedented

view of their interior. We organized IAUS402 so that experts from complementary communities could gauge the progress that has been made so far, identify areas of opportunity, and discuss future technological developments.

The meeting location, Ensenada, Baja California, hosts the northern campus of the Institute of Astronomy of Universidad Nacional Autónoma de México, where multiple researchers work on massive-star related science. The state of Baja California is also where the National Astronomical Observatory of San Pedro Mártir is located. This is one of the main astronomical observatories in Mexico, and the one which hosts our largest optical telescope. The southernmost campus of the University of California (San Diego), in the USA, is only 89 miles away from Ensenada and several researchers work on massive-star related topics there. Thus, the location of the meeting provided great opportunities for collaborative research. Mexicans were the most numerous participants after Americans from the USA.

We had a total number of registered participants to IAUS 402 of 124 (27 of which were online participants), from six different continents and 27 countries (counted by the first affiliation of institutes/university for each participant). A high percentage of them were early-career participants, many of which gave talks. For each session, we had an opening overview talk, two invited talks, and generally 6 contributed talks, for a total of 72 talks.

The conference hall was fully equipped with audio-visual facilities and Wi-Fi to enable the hybrid Zoom option. LOC member (Carlos Román Zúñiga) prepared a workspace in Zulip (instead of Slack) to enable synchronous and asynchronous discussions and communication between online and in-person participants. The good quality of the internet connection enabled online participants to interact smoothly with in-person attendees. We shared the slides, electronic versions of posters, and Zoom recordings via e-mail with the participants. No major problems occurred during the hybrid talks and sessions ran smoothly, thanks to LOC members Ricardo López Valdivia and Manuel Núñez, the technical staff hired for the symposium, the support staff from "Hotel Marina y Coral", and student volunteers. A foyer with natural light, located in front of the conference hall, was used for coffee breaks, where coffee, tea, sodas, water and cookies were served. The posters were displayed in a room adjacent to the conference room, in order to mitigate the noise from the coffee breaks. Beverages were allowed in that room. The poster exhibit included two posters prepared by the IAUS's G2 "Massive Stars" commission. The first poster had obituaries honoring the lives of 13 astronomers involved in massive-star research, who had passed away since the last IAU massive-stars symposium. The second poster described the activities of this Commission. Although most posters were printed and displayed in-person, we accepted three on-line posters of individuals who registered to the conference and wouldn't have been reimbursed for their registration by their institutions without at least an electronic poster. Since there were no poster flash talks and in order to promote poster viewing, a poster scavenger hunt with prizes was organized by the SOC co-chairs, where a questionnaire had to be completed. 13 participated in the scavenger hunt. The prizes were "alebrijes", which are traditional pieces of Mexican art. There was ample time during the coffee breaks of the morning and afternoon sessions to stimulate off-line discussion, especially between early-career and senior astronomers, which is one of the biggest advantages of in-person meetings. We provided three lunches for the attendees on the 15, 16, and 17 of September (excluding the excursion and final day of the symposium), which provided additional time for discussions.

The LOC and hotel staff organized associated social events for participants and their accompanying persons. A welcome cocktail with drinks and canapes was held on Monday evening (September 15 2025) at a hotel terrace overlooking the Ensenada Bay and marina. This was after the first day of science sessions, which enhanced the number of participants to this activity, as everyone had already arrived at the venue. Ensenada is known for its thriving wine industry and for being ranked by UNESCO as a "City of Gastronomy" in 2015. In order to showcase these aspects of the local culture, an excursion to a local winery, including a "fusion-style" meal was offered on Wednesday afternoon (September 17 2025, 65 participants). Finally, a conference banquet with a traditional Mariachi band, a local DJ, and dancing was offered at the peer of the hotel, on Thursday evening (September 18 2025). Meat, vegetarian and vegan options, as well as non alcoholic beverages were available for all meals served as part of the symposium.

We organized two outreach and educational activities to enhance the legacy of the IAUS 402 in Ensenada. A public talk on Gaia/Milky Way/massive-star science was given by Dr. Jesús Maíz-Apellániz, one of the invited speakers to our symposium, on September 19 (Fri) 2025, in the auditorium of the Caracol Science Museum of Ensenada. As the speaker was from Spain, the talk was given in Spanish, which is the local language. The total number of attendees was about 20. In addition, members of the LOC (María de los Ángeles López Villegas, Alma Maciel and Carlos Román Zúñiga) organized a drawing contest on massive stars for Ensenada middle-school students. A text describing massive stars was prepared and made available to the students, in order to provide background on the topic prior to the contest, by LOC members. An exhibit of the best 25/40 drawings was held at the Caracol Science Museum of Ensenada. We gave celestron binoculars as prizes to the best three drawings, which were selected by members of the LOC. The prizes were

given on the day of the public talk, so that the students would meet the invited speaker. The drawings will constitute a traveling exhibit in Ensenada until the end of the year. In particular, the exhibit will be displayed on November 29th 2025 at a major outreach event that takes place simultaneously, nation-wide, every year, “Noche de las Estrellas”, which is usually attended by hundreds of individuals of all ages in Ensenada. This event is completely free of charge.

We would like to thank the Institute of Astronomy of Universidad Nacional Autónoma de México for their financial support to IAUS 402. Staff from Hotel Coral y Marina and the Caracol Museum of Science in Ensenada also supported local planning. We would also like to thank our designer and webmaster: Abisair Lucero, for his hard work. For IAUS 402, Division G “Stars and Stellar Physics” agreed to be the coordinating division; Divisions H "Interstellar Matter and Local Universe" and J "Galaxies and Cosmology", as well as Commission G2 “Massive Stars”, also kindly supported IAUS 402. Finally, we would like to thank the IAU for supporting 25 participants via travel grants that enabled their participation.