

FAST-University of Abomey-Calavi & AfAS - African Astronomical Society

First Summer School in Astronomy in Benin

*Astrophysics for Sustainable development in Sub-Saharan Africa
July 06-09, 2026 at the Francophone Digital Campus of UAC (Benin)*

Detailed schedule of activities

Astrophysics for university education: concepts, methods, and modeling

Program for physics teachers - University of Abomey-Calavi and other Universities in Benin.

Period: July 06 to 09, 2026

Location: Francophone Digital Campus of UAC, Abomey-Calavi

Format: Hybrid: in-person teaching, workshops, and exchanges with remote interventions

Target audience: Professor-researchers, researchers, PhD students, advanced students, and scientific stakeholders interested in astronomy, astrophysics, and their applications

Pedagogical logic: The schedule follows the progression of the program: positional astronomy and sky observation, stellar astrophysics, galactic and extragalactic astronomy, then cosmology, astroparticles, and modern computational tools. Each day articulates conceptual inputs, demonstrations & exercises, scientific discussions, pedagogical synthesis...

Expected speakers:

In-person:

1. Prof. James Chibueze, Head of the UNISA Centre for Astrophysics and Space Sciences, South Africa; Vice-President of the International Astronomical Union, originally from Nigeria;
2. Dr. Nadeem Oozeer, Researcher at the South African Radio Astronomy Observatory, Cape Town, South Africa, originally from Mauritius;
3. Prof. Jamal Mimouni, Univ. of Constantine 1 & CERIST, Depart. of Physics, Algeria, past AfAS President.

Remote:

4. Prof. Mirjana Povic, Researcher at Ethiopian Space Science and Technology, Addis Ababa;
5. Dr. Marie Korsaga, Depart. of Physics, Joseph KI-ZERBO University, Burkina Faso;
6. Benedicta Woode, GSSTI, Ghana;

7. Dr. Omar Nemoul, CERIST Research Unit, Algeria

Adopted time rules: Mornings are structured around two pedagogical blocks separated by a coffee break from 10:00 to 10:30 AM. Lunch break is scheduled from 1:00 to 2:00 PM. Afternoons are dedicated to in-depth studies, practical workshops, remote interventions, participant feedback, and syntheses.

Day 1 - Monday, July 06, 2026: Positional astronomy and sky observation

Time	Detailed Activities	Speaker(s) / Responsibility	Modality
08:30-09:50	Official opening ceremony. Address by the Scientific Council of UAC; word from the Physics Department; pedagogical objectives and expectations,...	Scientific Council of UAC; LOC; J..Mimouni for AfAS, James Chibueze for IAU	In-person /
09:50-10:00	The Transient Array Radio Telescope (TART)	Nadeem Oozeer	
10:00-10:30	Coffee break. Welcoming participants	Logistics Committee	Break
10:30-11:20	What is Astronomy Today? Introduction to modern astronomy	James Chibueze	In-person
11:20-12:05	Celestial Mechanics & Position Astronomy - Newtonian Dynamics: from the motion of planets, to artificial satellites, to galactic astronomy, to (Newtonian) cosmology. - The Celestial Sphere and the Coordinate Systems; Astronomical Time Systems: Coordinate Perturbations, reading a sky map	Jamal Mimouni	In-person
12:05-13:00	Spherical trigonometry and coordinate systems. Coordinate conversions; determining the visibility of an object; mini-workshop: preparing an observation from Abomey-Calavi.	James Chibueze	In-person
13:00-14:00	Lunch break.	Logistics Committee	Break
14:00-14:55	Astronomical telescopes Instruments, detectors, and atmospheric effects. Refracting, reflecting, and catadioptric telescopes; mounts; CCD/CMOS; quantum efficiency; noise;	Nadeem Oozeer	In-person
14:55-15:40	Practical session sky recognition, Constellations, seasonal variations, orientation by the Southern Cross or the North Star; pedagogical value of direct observation. Stellarium and Sky map, Find today's Moon and locate planets, Constellations	Nadeem Oozeer	In-person
15:40-16:10	Day 1 synthesis. What have we learned?	James Chibueze; Jamal Mimouni; Nadeem Oozeer	In-person

	Q&A, clarification of mobilized physical prerequisites, preparation instructions for day 2.	Pedagogical Committee	

Day 2 - Tuesday, July 07, 2026: Stellar astrophysics

Time	Detailed Activities	Speaker(s) / Responsibility	Modality
09:00-10:00	Stellar Astrophysics I Stellar atmospheres and spectral classification. Black body radiation; the Hertzsprung-Russell diagram. Stellar classification, Saha equation ...	James Chibueze	In-person
10:00-10:30	Coffee break.	Logistics Committee	Break
10:30-11:15	Stellar Astrophysics II Internal structure of stars; energy transport; nucleosynthesis.; mass, luminosity, and lifespan; exercises.	Jamal Mimouni	In-person
11:15-12:10	Star Formation and evolution A researchers perspective	Benedicta Woode	Remote
12:10-13:00	Virtual Observatory (VO) Programming, databases, and virtual observatory. Introduction to SIMBAD, VizieR, SDSS, Gaia, and MAST archives.	Mirjana Povic	Hybrid
13:00-14:00	Lunch break.	Logistics Committee	Break
14:00-14:25	Research career in modern astrophysics Scientific and pedagogical exploitation of observational data; opening towards African collaborations.	Mirjana Povic	Remote
14:25-14:50	West Africa research and cooperation Examples of research conducted in West Africa; prospects for training and regional cooperation.	Marie Korsaga	
14:50-15:40	Practical Session - HR diagram etc... Scientific Python: NumPy, SciPy, Matplotlib,	James Chibueze/Nadeem Oozeer	In-person

Day 3 - Wednesday, July 08, 2026: Galactic and extragalactic astronomy & Cosmology

Time	Detailed Activities	Speaker(s) / Responsibility	Modality
09:00-10:00	Radio Astronomy Radio telescopes, Single Dish, Interferometry	James Chibueze	In-person
10:00-10:30	Coffee break.	Logistics Committee	Break
10:30-11:20	Introduction to galaxies and their classification	Mirjana Povic	Remote
11:20-12:15	Galactic dynamics and dark matter. Rotation curves; dynamic mass versus visible mass; dark matter candidates; value of radio observations.	Marie Korsaga	Remote
12:15-13:00	Practical workshop. Object search in public databases; simple queries, ADQL, catalog cross-matching; pedagogical exploitation without a dedicated telescope.	Nadeem Oozeer	In-person
13:00-14:00	Lunch break.	Logistics Committee	Break
14:00-15:00	Introduction to Cosmology The hot Big Bang theory; Lemaitre-Hubble's law; Friedmann equations; cosmological parameters, cosmic microwave background, primordial nucleosynthesis...	Omar Nemoul	Remote
15:00-15:35	Radio Astronomy II Radio Galaxy, Giant Radio Galaxy, Galaxy Clusters, Energetics of radio galaxy,	James/Nadeem Oozeer	In-person/Hybrid
15:35-16:10	Teaching Array Radio Telescope (TART) Introduction and Practical session Python: Astropy; FITS files	Nadeem Oozeer	In-person

Day 4 - Thursday, July 09, 2026: HE astrophysics & cosmic rays, astrophysics tools, and Roadmap

Time	Detailed Activities	Speaker(s) / Responsibility	Modality
09:00-10:00	- High Energy Astrophysics Multimessenger astronomy: Cosmic Rays physics Gamma-Ray Bursts (GRBs), AGN's, Magnetars, FRBs and all that... Neutrino Astrophysics and GWs - Position Astronomy : Complements...	J.Mimouni	In-person
10:00-10:30	Coffee break.	Logistics Committee	Break
10:30-10:45	The CosmoLAB Hub experience The Culture of Entrepreneuriat in Astronomy and the Space Sciences	Thierry Tchangolé	In-person
10:45-10:55	Amateur Astronomy in Benin	Prudence Ayivi	
10:55-11:20	Participant feedback & Post-school roadmap Official closing	Participants; Pedagogical Committee; Organizing Committee;	
11:20-12:00	Words of thanks, final recommendations, awarding of certificates, and family photos.		
13:00-14:00	Lunch	Logistics Committee	Break

Summary of mobilized physical skills and branches

- Classical mechanics: orbits, reference frames, hydrostatic equilibrium.
- Electromagnetism: radiation, spectroscopy, acceleration.
- Thermodynamics and statistical mechanics: stellar structures, CMB, degeneracy.
- Quantum mechanics: spectral lines, degeneracy pressure, quantum tunneling.
- Nuclear physics: fusion, nucleosynthesis, cross-sections.
- Particle physics: dark matter, neutrinos, high energies.
- General relativity: black holes, gravitational waves, cosmology.
- Fluid dynamics: interstellar medium, accretion disks.

- Optics: telescopes, detectors, atmosphere.
- Signal processing and statistics: data, errors, modeling.

Working document. Speaker names and session titles may be adjusted according to the actual availability of experts, while maintaining the pedagogical progression of the four days.

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