Program

Lessons and conferences

- **Cathy Boonne,** IPSL, Paris
Tuesday, 9:30 to 10:30 (Ether)
Overview of Ether data center facilities

This presentation will provide an overview of Ether's facilities and examples of how some web services can be used by end-users to conduct data studies. We outline also in our presentation the capabilities of the GEISA database (products, information, access, added value services) in order to promote the links between spectroscopy, kinetics, and atmospheric chemistry.

- Introduction to Ether data center
- Ether data center organization
- Focus on available data (satellite, in situ spectroscopy kinetics) an how to obtain them
- Focus on web services available
- The GEISA databank capabilities
- Lessons learned

- **Massimo Carlotti,** DCFI, Bologna
Thursday, 10:30 to 12:30 (Remote sensing)
Remote sensing

Principles of atmospheric remote sensing. Observation geometries, Absorption and emission spectroscopy of the atmosphere. Ground based, aircraft and balloon based observations. Satellite observations. Analysis methods for remote sensing observations.

- **Gaëlle Dufour,** LISA, Créteil
Friday, 11:30 to 12:30 (IASI)
Observation of the Earth atmosphere from space: example of the IASI instrument

The lesson will give a brief overview of the past, current, and future satellite missions used to probe atmospheric composition of the troposphere. The large potential of satellite mission to better understand atmospheric chemistry and transport will be illustrated with the IASI/MetOp mission.

- **Maryvonne Gérin,** LERMA/ENS, Paris
  Tuesday, 14:00 to 15:30 (Astro. Spectroscopy)

  ## Molecular Spectroscopy in astronomy: Ground based and space born telescopes

  Since the first detections of molecular lines in comets and in the ISM in the first part of 20th century, the use of molecular lines for the diagnostic of astrophysical sources and environments has developed steadily. I will present the various instruments and techniques used across the electromagnetic spectrum to probe molecular lines and perspectives for the near future.

- **Javier R. Goicoechea,** Centro de Astrobiologia, CSIC, Madrid

  - Monday, 15:30 to 17:00 (Astro I)

    ## The Molecular Universe: Introduction and motivations

    Motivations, Global introduction to the field, environments where we detect molecules, etc.

  - Tuesday, 11:00 to 12:30 (Astro II)

    ## Astrochemistry: how are molecules formed in Space?

    Basic notions, basic mechanisms for the formation and destruction of molecules in different environments (interstellar medium, star forming regions, etc.).

- **Nathalie Huret,** LPC2E, Orléans

  - Monday, 10:30 to 12:30 (Atmosphere I)

    ## Physics (and chemistry) of the earth atmosphere

    Summary not yet available.

  - Tuesday, 17:00 to 18:00 (Atmosphere II)

    ## Physics (and chemistry) of the earth atmosphere

    Summary not yet available.

- **Muriel Lepère,** UNAMUR, Namur
  Friday, 10:30 to 11:30 (Line profiles Exp.)

  ## Measurements and lineshape parameters
  Summary not yet available.

- **Raúl Martinez,** CSIC, Madrid
  Wednesday, 8:30 to 10:00 (Collision relaxation rates)

  ## Collisional relaxation rates between rotational levels

  An overview of collisional relaxation with special emphasis on the experimental measurement of rotational relaxation rates through the use of stimulated Raman spectroscopy.

- **Roman A. Motiyenko,** PhLAM, Lille
Thursday, 14:00 to 16:00 (MW spectro)
Microwave spectroscopy: lab and space

Laboratory spectroscopy: from microwaves to terahertz domain, instrumental aspects. Rotational spectra analysis and application to the molecules of astrophysical interest.

- **Hermann Oelhaf,** IMK, Karlsruhe
Thursday, 16:30 to 17:30 (Hyperspectral Imagery)
Imaging Fourier transform spectroscopy in the Infrared spectral domain for atmospheric research

Scientific motivation, Fourier transform spectroscopy (FTS), from scanning to imaging, basic requirements and design considerations for imaging FTS (iFTS), calibration and characterization, data processing, airborne and space borne platforms and related instrument examples, observation geometries (Nadir, limb, tomography), science applications, challenges.

- **Sébastian Payan,** LATMOS, Paris
  - Wednesday, 10:30 to 12:00 (Rad. Transfer)
  ## Radiative transfer and inversion

  This first course will focus on how to calculate or simulate atmospheric spectra:

    - radiation-matter interactions
    - Radiative transfer equation / application to remote sensing
    - layer-by-layer approach
    - Line of sight geometries
    - Case study
  - Thursday, 8:30 to 10:00 (Inversion)
  ## Radiative transfer and inversion

  This second course will focus on the retrieval processes and algorithm.

    - Inversion concept
    - Spectra fitting using least squares technique
    - Information content analysis (weighting functions, averaging kernels, informational entropy, degree of freedom).
    - Error analysis

- **Vincent-Henri Peuch,** ECMWF, Reading, and CNRM, Paris
Monday, 9:00 to 10:00 (Satellites & meteorology)
From spectroscopy and satellites to operational meteorological predictions and environmental services

Summary not yet available.

- **Laurence Régalia,** GSMA, Reims
  Tuesday, 15:30 to 16:30 (Lab IR spectro)
  ## Laboratory infrared spectroscopy

  Summary not yet available.

- **Wolfgang Stahl,** RWTH, Aachen
  Friday, 8:30 to 10:00 (Ab Initio)
  ## Physics of large molecules with quantum chemistry calculations

  Summary not yet available.

- **Ha Tran,** LISA, Créteil
  Wednesday, 12:00 to 13:00 (Line-mixing)
  ## Line-mixing modeling for remote sensing

  Collisional line-mixing is a process which is known to affect the treatment of atmospheric spectra for several species. Recent works on the modeling of line-mixing effects will be presented for different molecular systems. It will be shown that the widely used Voigt profile leads to large discrepancies with respect to measured spectra and accounting for line-mixing effects is unavoidable to correctly model measurements. Comparisons between laboratory, atmospheric spectra and simulations using our models show good agreements.

- **Ann Carine Vandaele,** BISA, Brussels
  Thursday, 17:30 to 18:30 (Venus)
  ## The atmosphere of Venus (and Mars)

  Comparative planetology and in particular the comparative study of atmospheres aims at a better understanding of the different processes governing those atmospheres, and finally will improve the knowledge of our own planet. Interaction between the atmospheres and the Sun radiation, magnetosphere or surface, as well as circulation and dynamical processes exist in all atmospheres. Investigating and comparing them give clues to a global comprehension of these processes. Venus, Mars and the Earth have a stable atmosphere whose composition is built on the same constituents. However these three planets have very different physical properties (surface pressure and temperatures for example) We will try to explain how, from very similar initial conditions, these planets have evolved to very different present environments.

- **Jean Vander Auwera,** Université Libre de Bruxelles, Brussels
  - Monday, 14:00 to 15:30 (Spectro I)
    ## Principles of vibration-rotation spectroscopy

    Interaction of radiation with matter; basic line profiles; simple modeling of absorption spectra; molecular rotation and vibration.

  - Tuesday, 8:30 to 9:30 (Spectro II)
    ## Principles of vibration-rotation spectroscopy

    Vibration-rotation energy levels, transitions and spectra of polyatomic molecules; how interactions between vibration and rotation can affect molecular spectra.

Tutorials

- **Laurent Coudert,** LISA, Créteil
Tuesday, 18:00 to 19:30 (Spectro tutorial)
A short introduction to high-resolution spectroscopy: line assignment and line position analysis

The high-resolution spectrum of an unperturbed vibrational band will be assigned and fitted with the help of a computer program allowing us to calculate rotational energies of an asymmetric-top molecule.

- **Sébastian Payan,** LATMOS, Paris
    1. Wednesday, 18:30 to 19:30 (Inversion tutorial I)
    ## Radiative transfer simulation

    A simple (but realistic) radiative transfer model and retrieval algorithm will be used to perform simulation of atmospheric spectra (around a CO_2 band used for the retrieval of this species).

    2. Thursday, 18:30 to 19:30 (Inversion tutorial II)
    ## Retrieval practice

    Fit of a real satellite spectrum will be performed.

- **Nathalie Poulet-Crovisier,** IPSL, Paris
Tuesday, 21:00 to 22:00 (Ether tutorial)
Some demonstrations of the capabilities of the Ether database. Space experiments, balloon borne experiments, GEISA database.

This lesson aims to show an overview of the data sets available within Ether database:

- What kind of data and formats are available?
- Where are they stored and how to recover these data?
- Focus on a few data.

Posters

- Christophe Anselmo, University of Lyons
  Methane detection with optical correlation spectroscopy

- Chiheb Bahrini, LISA, Créteil
  Application of the absorption CRDS technique to the detection of trace species in some reactive systems

- Elisa Castelli, ISAC-CNR, Bologna
  Application of molecular spectroscopy for the investigation of the Earth Upper Troposphere/Lower Stratosphere composition using a millimeter-wave airborne spectrometer

- Andrea Chiavassa, Observatoire Côte d'Azur
  Three-dimensional radiative transfer in stellar and planetary atmosphere

- Damien Dargent, LADIR, Paris
  Characterization of hydrated complexes with gas phase infrared spectroscopy

- Nicolas David, IPR, Rennes
  PAHs and soots formation in circumstellar envelope of AGB stars

- Marie-Renée De Backer, GSMA, Reims
  Recent studies of the isotopologues of Ozone in the high energy range

- Dariusz Golebiowski, ULB, Brussels
  Monomer and multimers of ammonia. First results

- Friederike Graf, IMK, Karlsruhe
  Pointing engineering and LOS stability analysis in imaging FTS

- **Laurence Guinet,** LATMOS, Paris
  High Altitudes Luminous Events Studied by Infrared Spectro-imagery (HALESIS)

- **Imane Haykal,** PhLAM, Lille
  Spectroscopy of astrophysical molecules

- **Gwenael Larcher,** LISA, Créteil
  Line shapes of CO_2 by diode-laser spectroscopy

- **Charlotte Oudot,** LATMOS, Paris
  ISAI MetOP radiance (Level 1C) analyzes for methane and carbon dioxide over 5 years

- **Anatoly Pavlyuchko,** UCL, London
  About simplification of the rovibrational Hamiltonian of many atomic molecules

- **Séverine Robert,** BISA, Brussels
  Spectral inventory of the SOIR spectra on board Venus Express

- **Clara Sousa-Silva,** UCL, London
  ExoMol - Molecular Line Lists for Modelling Cool Atmospheres

- **Melody Sylvestre,** LESIA, Meudon
  Modelisation of Saturn's atmospheric dynamic using Cassini-Huygens data

- **Piotr Wcislo,** NCU, Torun
  Line shape modeling for ultra-precise spectroscopy data analysis

- Olena Zakharenko, PhLAM, Lille
  High resolution broadband terahertz spectroscopy using a frequency multiplier chain