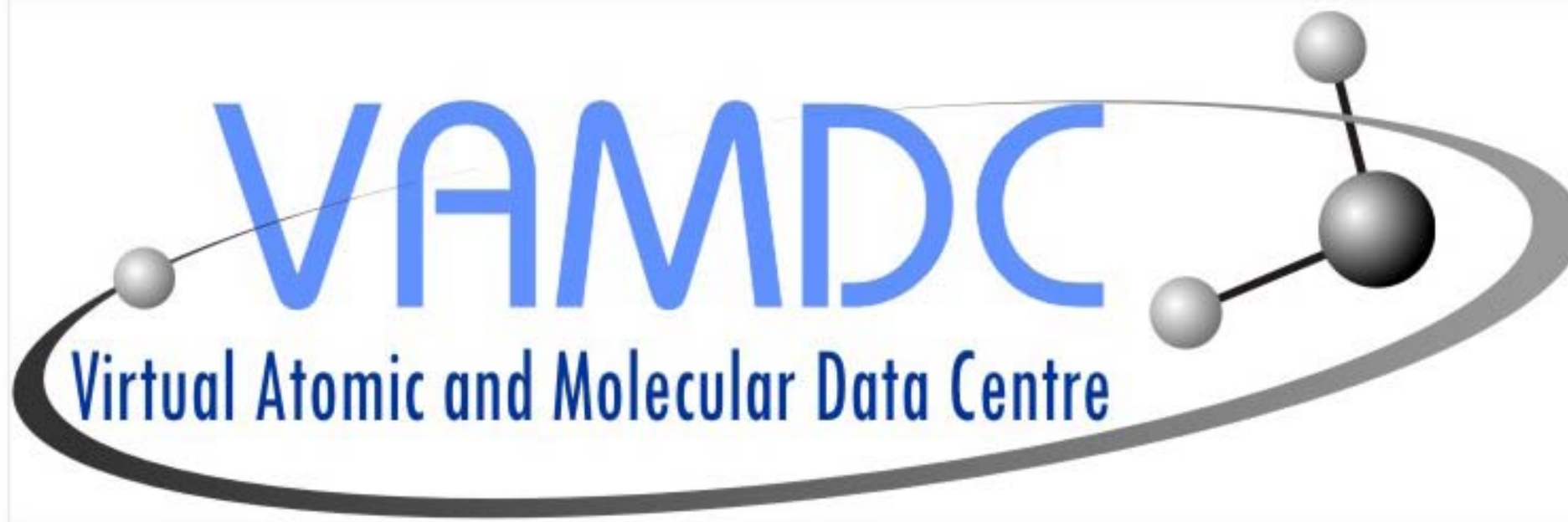


EUROPEAN VIRTUAL ATOMIC AND MOLECULAR DATA CENTER (VAMDC) AND SERBIAN VIRTUAL OBSERVATORY

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VAMDC

Virtual Atomic and Molecular Data Centre

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Virtual Atomic and Molecular Data Center (VAMDC) is an European FP7 project with aims to build a flexible and interoperable e-science environment based interface to the existing Atomic and Molecular data. It is a complex project including 15 institutions with 24 scientific groups France, Serbia, Russia, England, Austria, Italia, Germany, Sweden and Venezuela.



VAMDC

Collaboration between groups involved in the generation, evaluation, and use of atomic and molecular data. VAMDC aims to build a secure, documented, flexible and interoperable e-science environment-based interface to existing atomic and molecular databases. It will also provide a forum for training potential users .



1. Vienna Atomic Line Database (VALD)

The VALD database of atomic data for analysis of radiation from astrophysical objects. Created in 1995 in Vienna. The nodes are in Vienna, Uppsala and Moscow. A vast collection of spectral line parameters (central wavelengths, energy levels, statistical weights, transition probabilities, line broadening parameters) for all chemical elements of astronomical importance



2. CHIANTI

CHIANTI is an atomic database for spectroscopic diagnostics of astrophysical plasmas. Created in 1997. It is used in the analysis of optically thin collisionally ionised plasmas and is the preferred reference database in solar physics.
(sohowww.nascom.nasa.gov/solarsoft)
(www.damtp.cam.ac.uk/user/astro/chianti/)



3. EMol

- The EMol Database (Open University)
- Measured and calculated cross sections for electron interactions with molecular systems.
- Semi-empirical theoretical methods for evaluation.

4. CDMS

- Cologne Database for Molecular Spectroscopy (CDMS) (<http://www.ph1.uni-koeln.de/vorhersagen/>)
- Recommended values of spectroscopic transition frequencies and intensities for atoms and molecules of interest to the astronomical community and for studying the terrestrial atmosphere.



5. BASECOL

- The BASECOL database (<http://basecol.obspm.fr>)
- Excitation rate coefficients for ro-vibrational excitation of molecules by electrons, He and H₂.
- Used for the study of interstellar, circumstellar and cometary atmospheres.



6 GhoSST

- The GhoSST (Grenoble astrophysics and planetology Solid Spectroscopy and Thermodynamics, <http://ghosst.obs.ujf-grenoble.fr>) database service.
- Spectroscopic laboratory data on molecular and atomic solids and liquids.

7.UMIST database for astrochemistry

- University of Manchester Institute of Science and Technology (UMIST) Database for astrochemistry (<http://www.udfa.net/>), created in 1991.
- A fundamental set of reaction rate data and related software for use in chemical kinetic modelling of astronomical regions.



8. KIDA

Kinetic Database for Astrochemistry
(KIDA)

- Chemical reactions used in the modelling of the chemistry in the interstellar medium and in planetary atmospheres.
(<http://kida.obs.u-bordeaux1.fr>)



9 Polycyclic Aromatic Hydrocarbon spectral database

The CESR (Centre d'Etude Spatiale
des Rayonnements/CNRS)-Cagliari
spectral database of PAHs (polycyclic
aromatic hydrocarbons) and carbon
clusters

(<http://astrochemistry.ca.astro.it/database/>)



10 LASP Database

- The LASP (Laboratorio di Astrofisica Sperimentale) Database (<http://web.ct.astro.it/weblab/dbindex.html#dbindex>) at the Catania Astrophysical Observatory.
- Infrared (IR) spectra and constants of molecules in the solid phase, band strengths and other relevant quantities.
- Useful for studies of the profile of absorption bands of solid phase molecules observed in astronomical spectra recorded in the direction of interstellar molecular clouds.



11 Spectr-W3

- The Spectr-W3 atomic database (Russia)
- Experimental, calculated, and compiled data on ionization potentials, energy levels, wavelengths, radiation transition probabilities and oscillator strengths, and also parameters for analytic approximations for electron-collision cross-sections and rates for atoms and ions.

<http://spectr-w3.snz.ru>



12. CDSO

- The Institute of Atmospheric Optics (IAO) in Tomsk (<http://www.iao.ru/>) hosts
- The Carbon Dioxide Spectroscopic Databank (CDSO) (<http://cdsd.iao.ru> and <ftp://ftp.iao.ru/pub/CDSO-2008>)

13. S&MPO

- The S&MPO (Spectroscopy & Molecular Properties of Ozone) relational database
(<http://ozone.iao.ru><http://ozone.univ-reims.fr/> Tomsk-Reims)
- Programs for simulation of synthetic spectra .



14 "Spectroscopy of Atmospheric Gases"

- "Spectroscopy of Atmospheric Gases" (<http://spectra.iao.ru> Tomsk): is a compilation that contains databases HITRAN, GEISA and HITEMP.
- Programs for simulation of synthetic spectra



14a HITRAN

- HITRAN (High-resolution TRANsmission molecular absorption database)
- Line parameters for molecules in the gas phase
- Photoabsorption cross-sections for many molecules.
- Used by planetology community



14b HITEMP

- HITEMP, is a high temperature extension to HITRAN.
- GEISA An archive for Earth and planetary atmospheric studies



15 W@DIS

- W@DIS (Water Internet @ccessible Distributed Information System) (<http://wadis.saga.iao.ru> Tomsk) Experimental water-vapour spectroscopy data: energy levels, transition positions and line intensities, and line profile characteristics.

16.TIPTOP

- TIPTOPbase located at the Centre de Données astronomiques de Strasbourg, France (<http://cdsweb.u-strasbg.fr/topbase/home.html>)
- Atomic data computed in the Opacity Project and Iron Project, energy levels, *gf*-values, *A*-values, photoionization cross sections and electron impact cross sections and rates for light chemical elements with atomic number, $Z = 1 - 28$.

17 OPserver

- OPserver, located at the Ohio Supercomputer Center, USA, (<http://opacities.osc.edu/>)
- A remote, interactive server for the computation of mean opacities for stellar modelling using the monochromatic opacities computed by the Opacity Project. It can be accessed through a web portal or from a stellar modelling code.



The NIST (National Institute of Standards and Technology) Atomic Database

- Atomic Spectra Database contains evaluated data on about 77,000 energy levels and 144,000 spectral lines from atoms and ions of 99 elements.
- Handbook of Atomic Spectroscopic Data contains energy levels and prominent spectral lines for neutral and singly ionised atoms.



- The Spectral Data for the Chandra X-Ray Observatory database presents critically compiled wavelengths (20 Å to 170 Å), energy levels, line classifications, and transition probabilities
- Three bibliographic databases contain references on atomic energy levels and spectral lines, transition probabilities and spectral line shapes and line broadening



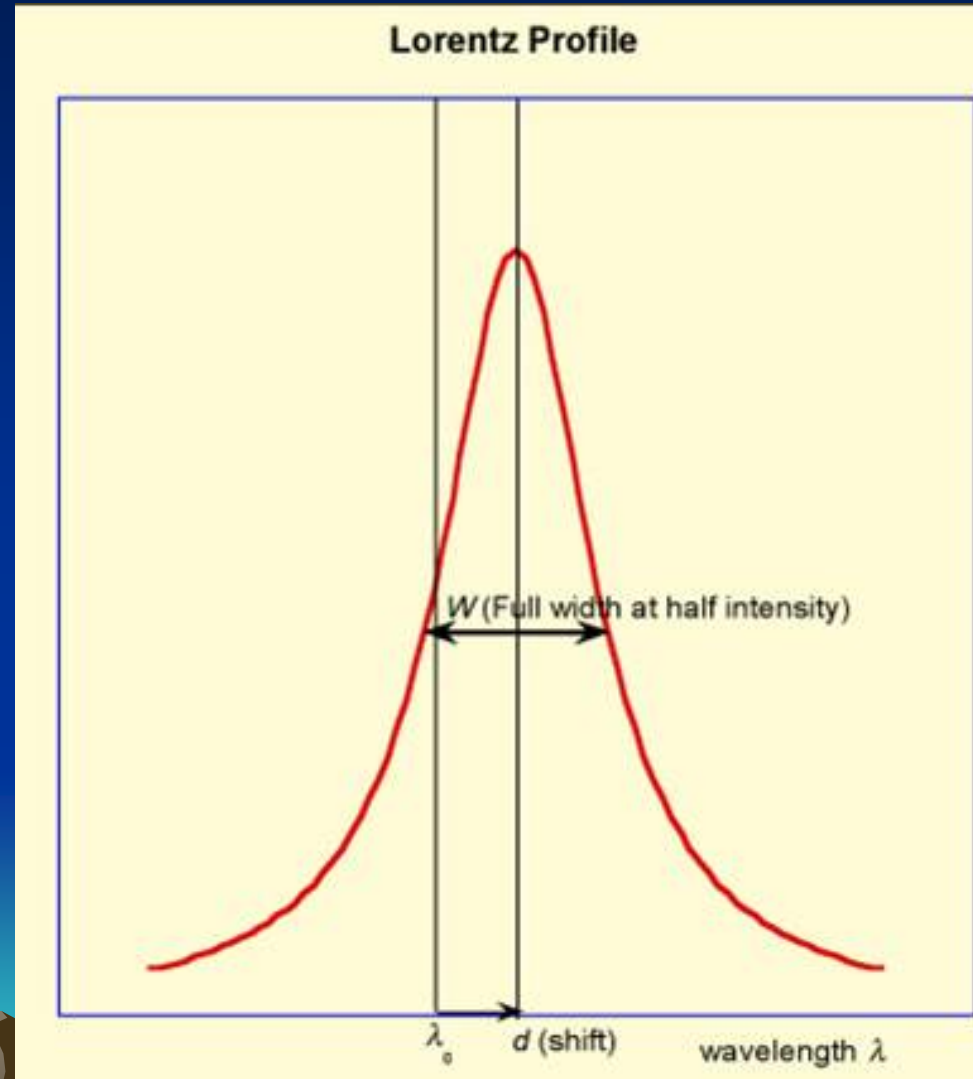
STARK-B

<http://stark-b.obspm.fr/>

- This is a database of calculated widths and shifts of isolated lines of atoms and ions due to electron and ion collisions.

This database is devoted to modellisation and spectroscopic diagnostics of stellar atmospheres and envelopes. In addition, it is also devoted to laboratory plasmas, laser equipments and technological plasmas.

- Broadening by interaction with charged particles =
- STARK BROADENING



STARK-B

Scientific objectives:

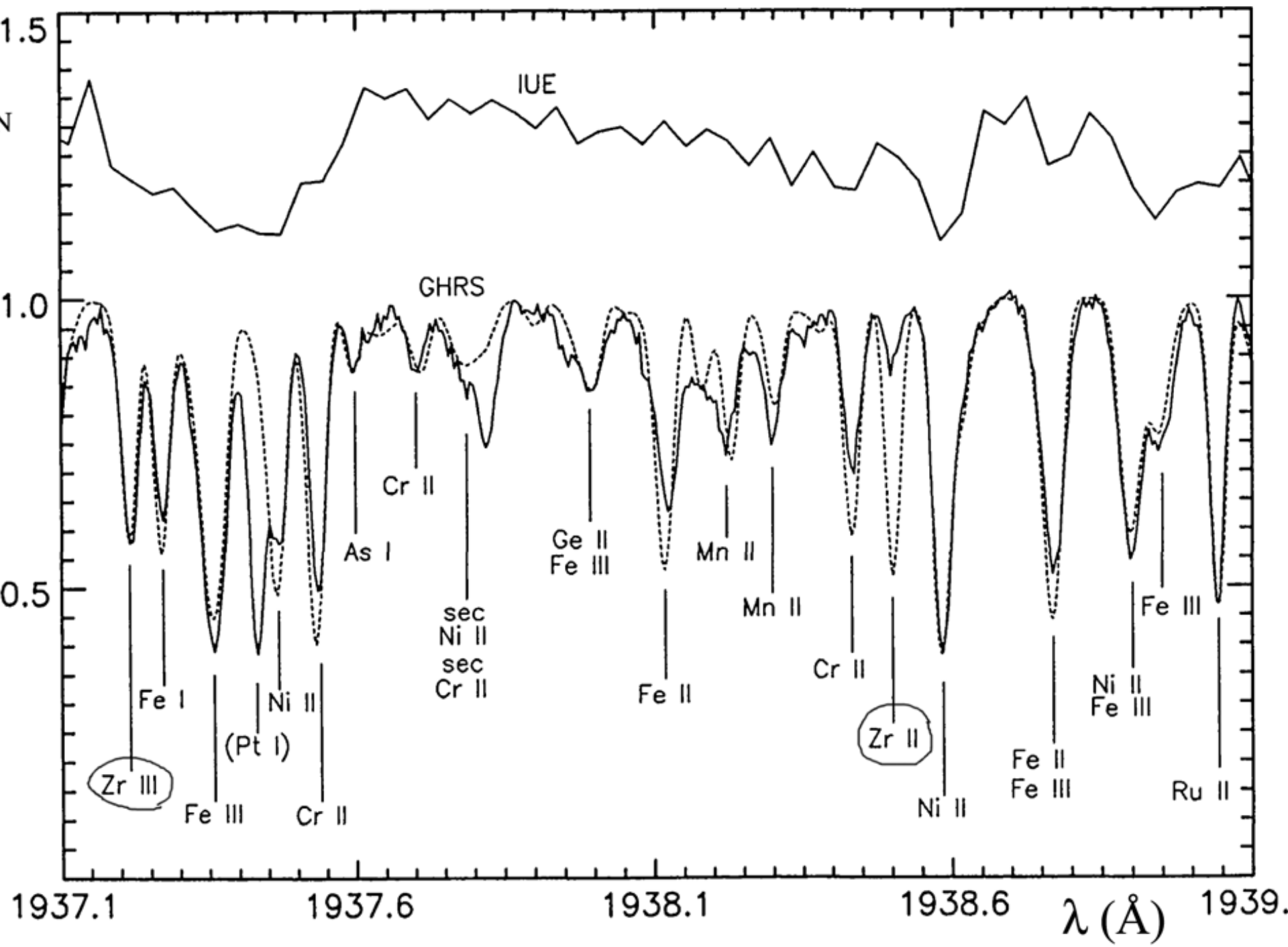
Spectroscopic diagnostics,
Modelisation
Synthetic spectra

Addresses

Astrophysics
Virtual Observatories
Laboratory and technological plasmas







NEEDS FOR LARGE STARK BROADENING DATA SET

- DEVELOPMENT OF COMPUTERS

FOR EXAMPLE:

PHOENIX CODE FOR MODELLING OF
STELLAR ATMOSPHERES INCLUDES
A PERMANENTLY GROWING
DATABASE WITH ATOMIC DATA FOR
MORE THAN 500 MILLIONS
TRANSITIONS

- SATELLITE BORNE SPECTROSCOPY



STARK BROADENING IS IMPORTANT FOR:

- PLASMAS IN ASTRONOMY**
- LABORATORY PLASMAS**
- PLASMA TECHNOLOGIES**



STARK BROADENING DATA ARE NEEDED IN ASTRONOMY FOR EXAMPLE FOR:

- STELLAR PLASMA DIAGNOSTIC**
- ABUNDANCE DETERMINATIONS**
- STELLAR SPECTRA MODELLING,
ANALYSIS AND SYNTHESIS**
- CHEMICAL STRATIFICATION**
- SPECTRAL CLASSIFICATION**
- NUCLEAR PROCESSES IN STELLAR
INTERIORS**
- RADIATIVE TRANSFER**
- STELLAR OPACITIES**



LABORATORY PLASMAS

- PLASMA DIAGNOSTIC
- PLASMA MODELLING
- LASER PRODUCED
PLASMA
- FUSION PLASMA

PLASMAS IN TECHNOLOGY

- LASERS
- LIGHT SOURCES

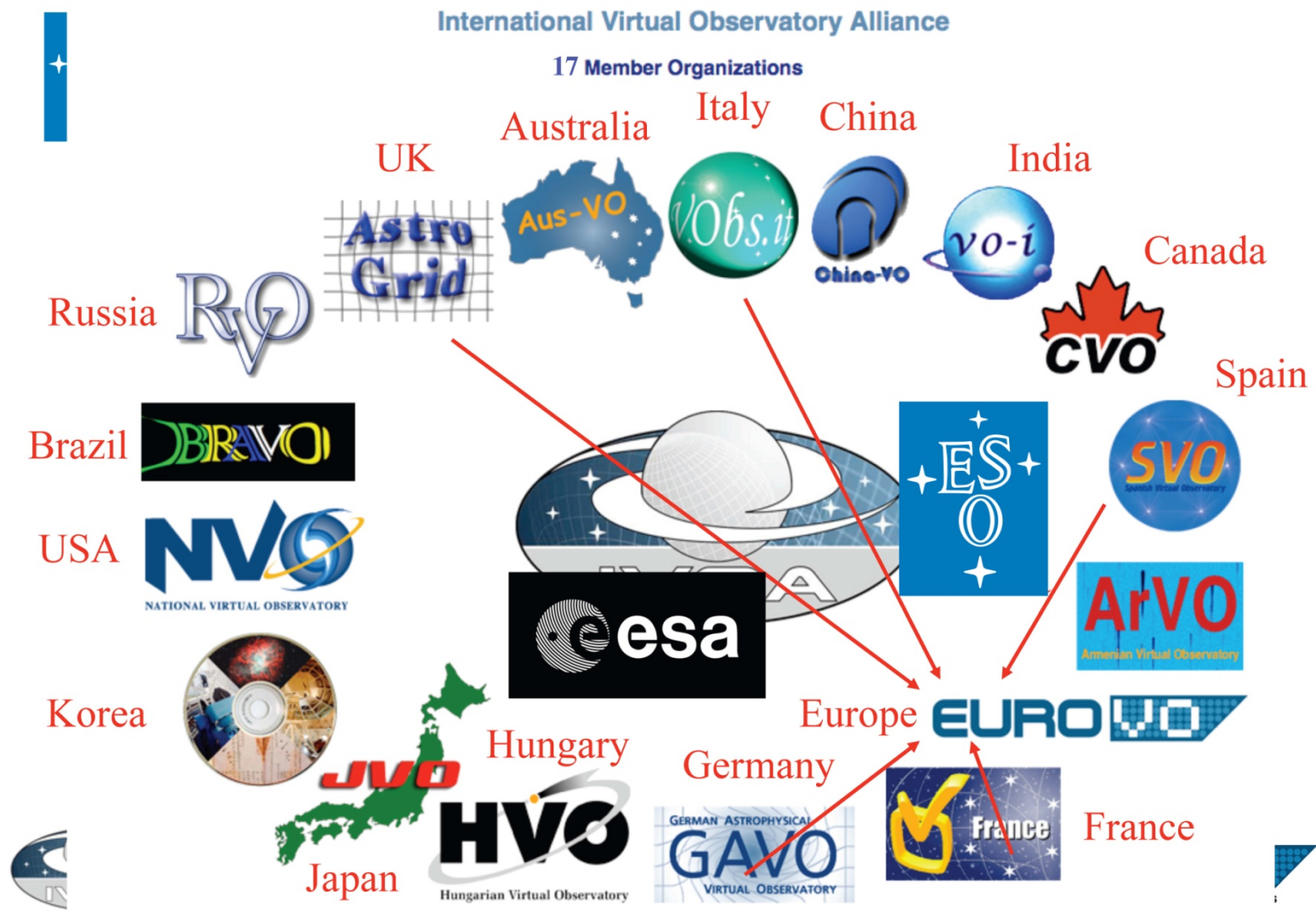


VAMDC

- Astronomical and plasma science
- Atmospheric Science
- Technological plasma
- Fusion community
- Radiation science
- Lightning industry



Serbian Virtual Observatory



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THANK YOU FOR
ATTENTION

