

<http://aecenar.com/institutes/iap>

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Research Groups & Projects

Experimental Astrophysics

Ground Based Radio Astronomy Station IAP-SWRDA
Infrared Sensor IAP-IRS
Gamma Astronomy Sensor IAP-GAMS
Spectroscopy Analysis Station IAP-SPECT
Meteorological Satellite Project IAP-SAT

Theoretical Astrophysics

Models for Pulsars, Supernovae, and Interstellar Media Processes

Publications 2010 – 2018 Full texts on <http://aecenar.com/publications>

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Ground based station for supernova remnant HI line radio wave detector and analyzer (SRWDA)

Hydrogen hyperfine structure: $1s$ state, energy difference $5.9 \times 10^{-6} \text{ eV}$, frequency 1420 MHz , wavelength $\lambda = 21 \text{ cm}$.

Spin mechanisms: Nuclear spin and Electron spin, Higher energy state, Spin flip, 1420 MHz , $\lambda = 21 \text{ cm}$.

21 cm HI Distribution: Holmberg II, NGC3077, MB1, MB2.

Antenna → Hardware assembly box (LNA, BPF 1420, AMP) → Digital signal processing (ADC, DDC, Tuner) → GNU-Radio (Display, Signalprocessing, Synchronization) on PC.

Next Working Packages (2018 – 2021):

Installing Ground Station, Development of precise gimbaled antenna to be able to take precise data from specific segments, Phase arrayed antenna development

Ground based infrared sensor IAP-IRS

IR Astronomy

Next Working Packages (2018 – 2021):

- Design of a proper infrared sensor
- Collect IR data from Canopus Region

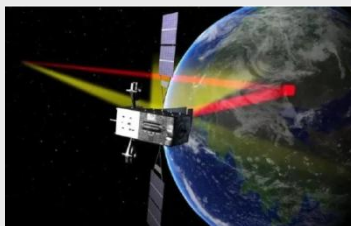


Illustration 1 : Caption: Black Widow nebula captured by Spitzer's IRAC. Credit: NASA/JPL-Caltech/E. Churchwell (University of Wisconsin-Madison) and the GLIMPSE Team

Spectrometer IAP-SPECT

Spectrometrical Analysis of Visual Data

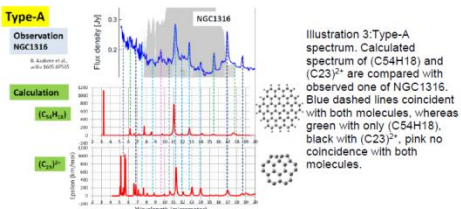


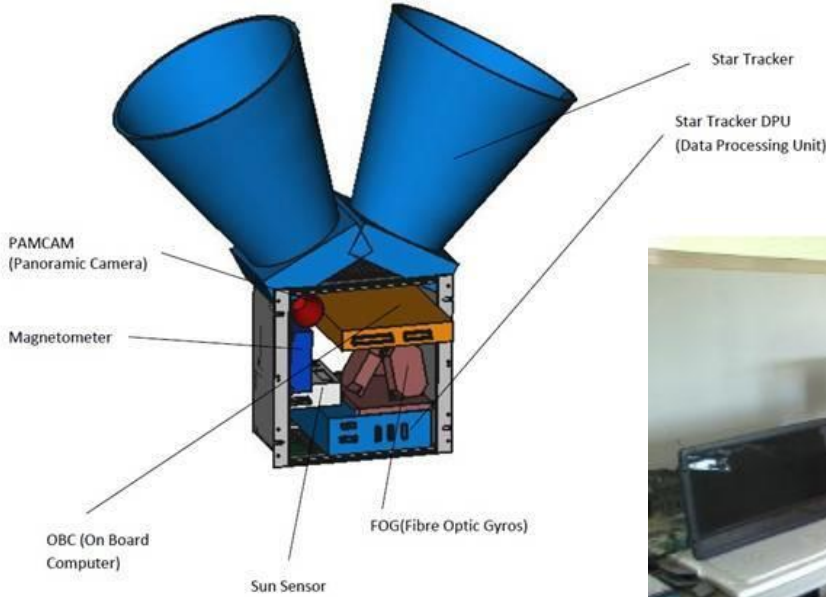
Illustration 3-Type-A spectrum. Calculated spectrum of $C_{54}H_{18}$ and C_{23} are compared with observed one of NGC1316. Blue dashed lines coincident with both molecules, whereas green with only $C_{54}H_{18}$, black with C_{23} , pink no coincidence with both molecules.

Next Working Packages (2018 – 2021):

- Building of Spectrometrical Station IAP-SPECT

Space Based Platform IAP-SAT

Satellite Bus



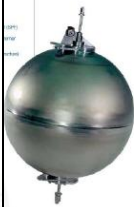
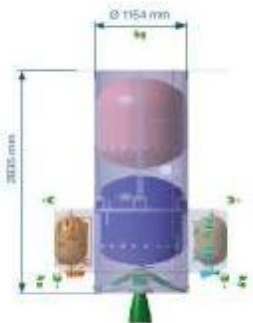
CHEMICAL ORBITAL PROPULSION MODULE

Chemical Orbital Propulsion Module for transfer orbit, attitude maneuver during transfer orbit, station keeping and deorbiting.

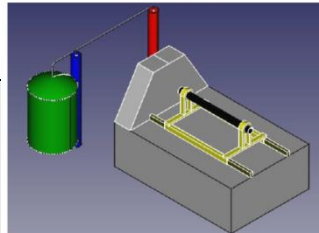
EPDM - BLADDER TANK BT 01/0

Bi-propellant UPS B2

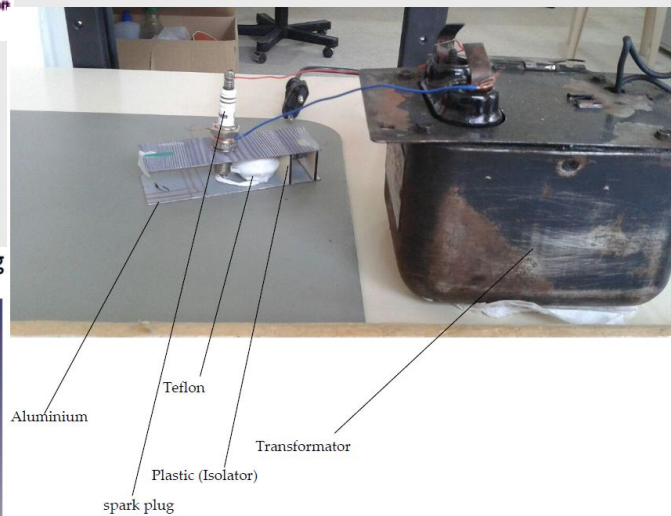
Propellant Loading Mass: 1600 kg

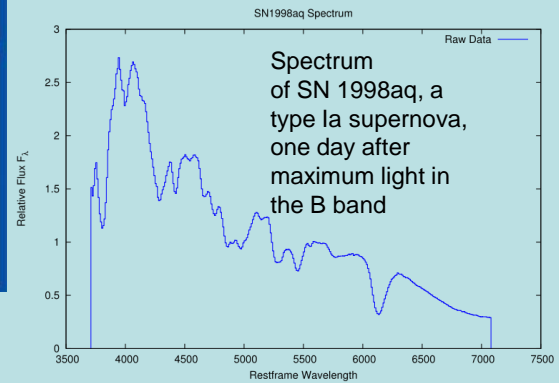
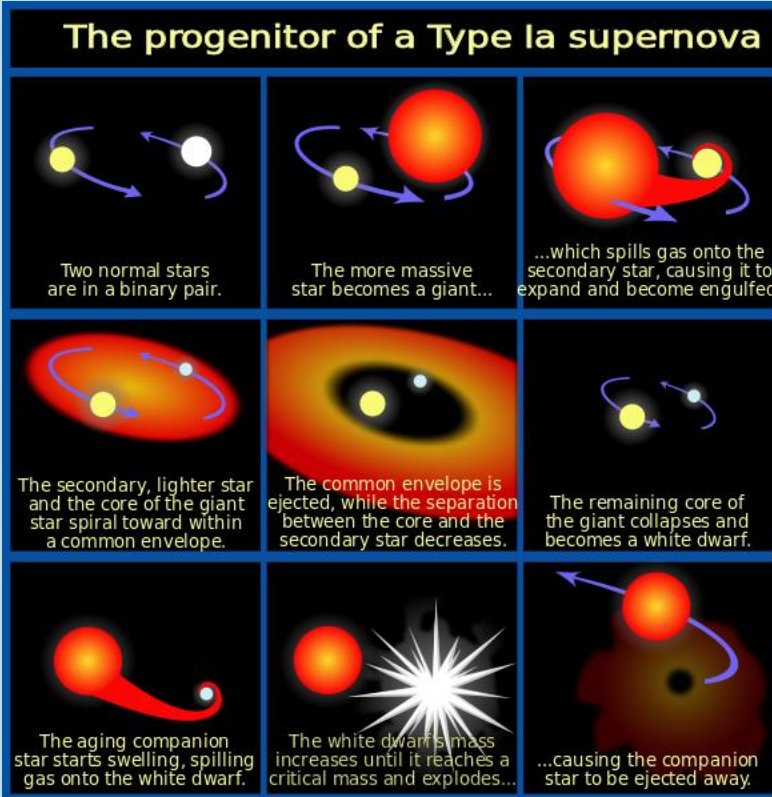


Chemical Propulsion Testrig

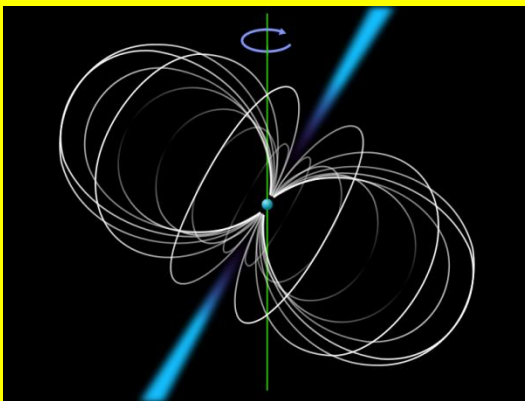


Electrical Propulsion Unit

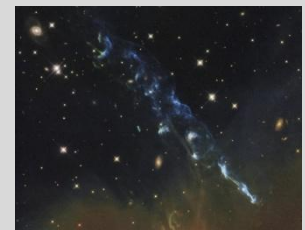
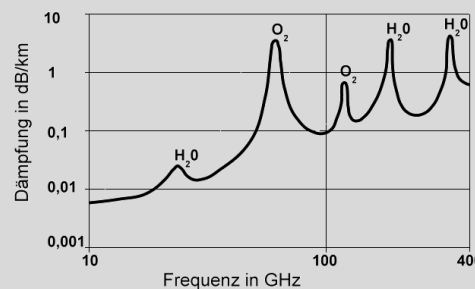




Models for Supernovae



Models for Pulsars



Models for Interstellar Media (ISM) Processes

Areas:

Plasma Physics, Thermodynamics, Magnetohydrodynamics (MHD), thermo-nuclear star processes, fusion processes, object orientated programming (C++/qt)