Analysis of the Low-Frequency Radio Noise Environment at Satellite Heights from Terrestrial Sources

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We have investigated the propagation of terrestrial radio sources from 1 to 30 MHz (HF spectral region) through the ionosphere for the purpose of characterizing the interference spectrum on potential space-based, low-frequency-radio telescopes. A recent survey of the HF noise environment at satellite heights from 1 to 14 MHz has been conducted using the WIND spacecraft. Radio frequencies for which the interference appears to be sufficiently low for radio telescopes are 1.3, 2.9, 3.1, 8.2, and 11.4 MHz. A model was developed to predict the HF noise environment. Our current model includes a source model, an ionospheric model, and a ray tracing model. The source model was developed using known commercial broadcast stations found in the World Radio TV Handbook. The ICED ionospheric model was used to generate a model ionosphere. By ray tracing a terrestrially based broadcast source through the model ionosphere, an ionospheric transfer function (ITF) was developed. By modifying the source model using the ITF, we were able to simulate the expected noise environment at satellite heights. Comparison of modeled and measured spectra show the majority of the noise environment is due to known commercial broadcasters. Improved modeling is necessary because of the slopes of the simulated spectra above the plasma frequency are too shallow, and the plasma cutoff frequencies are too high compared to the measured data.

Astrophysics Multispectral Archive Search Engine (AMASE)

Cynthia Cheung (NASA/GSFC), Gail Reichert (Hughes/STX), David Leisawitz (NASA/GSFC), James Blackwell (Hughes/STX), Nicholas Roussopoulos (UMIACS/University of Maryland)

AMASE is a new data-locating service on the World Wide Web provided by the Astrophysics Data Facility (ADF) at the NASA Goddard Space Flight Center (GSFC). It is an online multi- mission and multi-spectral catalog designed to help astrophysicists search for space mission data in the NASA public archives.

AMASE is a "metadata base" built using object-oriented data base (OODB) methodology which allows mission data to be searched easily by scientific parameters. Fundamental astronomical measurements are captured from published astronomical catalogs and used as criteria to search the mission data archives. The scientific attributes searchable in the AMASE prototype include astronomical names, positions, coordinates and classifications. Other parameters such as flux, spectral bandpass, surface brightness, color, velocity, proper motion and redshift will be searchable in later releases.

The AMASE prototype is currently populated with selected data products from two missions: the Infrared Astronomical Satellite (IRAS) and the Roentgensatellit (ROSAT), as well as various astronomical catalogs pertaining mainly to AGN and HII regions. The URL for the AMASE homepage is: http://amase.gsfc.nasa.gov/

Session 56: New Solar Instrumentation
Display Session, 9:30am-6:30pm
96/06/12, Tripp Commons

56.01
Sub-arcsecond X-ray Telescope for Imaging the Solar Corona at 1 keV

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Over the past several years at the University of Colorado we have been developing an X-ray telescope that uses a new technique for focusing X-rays with grazing incidence optics. The telescope uses spherical optics for all its components, thus utilizing the high quality surfaces obtainable when polishing spherical optics as compared to that of aspherical optics. A prototype engineering X-ray telescope has been fabricated and tested using the 300 meter vacuum pipe at White Sands Missile Range, NM. The telescope uses approximately 2 degree graze angles with tungsten coatings which gives a bandwidth of 0.25-1.5 keV and a peak effective area of 0.083 cm² at 0.83 keV. Results from X-ray testing at energies of 0.25 keV and 0.93 keV (C- K and Cu-L) will be presented which verify 0.5 arcseconds performance at 0.93 keV. Results from modeling the X-ray telescope's response to the sun show that the current optics design would be capable of recording on the order of 10 images of a solar active region during a 300 second NASA sounding rocket flight at resolution of 0.5 arcsecond.

56.02
A High Throughput X-ray Spectroscopy Mission - Probing the Mass Distribution and Chemical Evolution of the Universe

N.E. White (NASA/GSFC), and H.D. Tananbaum (SAO)

We are studying a new X-ray Observatory for high resolution, and broadband X-ray spectroscopy with a large collecting area. This mission represents the merger of the two approved NASA mission concept studies called the Next Generation X-ray Observatory (NGXO) and a Large Area X-ray Spectroscopy Mission (LAXSM). A selection of mission science goals are to: 1) Determine the abundance of all elements with atomic number between Carbon and Zinc (Z = 6 to 30) over a large range of redshift and on all scales in the universe; 2) Test cosmological models by studying clusters of galaxies including their evolution, associated dark matter distribution and mass fluctuations; 3) Constrain the evolution of supermassive black holes and test general relativity in the strong gravity limit by observing a large sample of AGN over a wide range of redshift and luminosity; 4) Observe the chemical enrichment of galaxies by studying supernova remnants and the interstellar medium within our galaxy and in nearby galaxies; and 5) investigate the role of magnetic fields in systems such as stars, jets, supernova remnants and the intergalactic medium. A resolving power of at least 300 across the line rich 0.4-10 keV band will resolve plasma diagnostic lines. This will be achieved using a combination of quantum calorimeters and reflection gratings with CCD readout. A resolution of 2eV at 6 keV is a design goal to provide velocity diagnostics of order 20 km/s and to fully resolve the iron K satellite lines. The use of calorimeter spectrometers will enable detailed spectral imaging of extended X-ray sources such as clusters of galaxies and supernova remnants. A hard X-ray telescope will provide simultaneous coverage of the 10-40 keV band to fully determine the underlying X-ray continuum and detect non-thermal emission processes. The peak collecting area is at least 15,000 sq cm. The most cost effective and minimal risk approach to achieve this large collecting area utilizes six identical low cost satellites.

56.03
Design Considerations for a Near Infrared Imaging Vector Magnetograph

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We present a preliminary design for an imaging vector magnetograph at 15648 Å. This instrument is intended as a potential source of vector magnetic field measurements for the USAF and NOAA solar activity prediction programs. It will consist of a blocking filter, two Fabry-Perot Etalons in tandem, a near-IR (10000 – 17000 Å) camera and associated polarization optics. Initial test results of the optical characteristics of this instrument and its expected performance characteristics will be described. We are exploring designs for operational vector magnetographs in the near-IR as a way to simplify vector magnetic field measurements while improving their accuracy.

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