use estimation theory to estimate the parameters of the mathematical expression. In this specific case three maps, at 2cm, 6cm and 20cm, of the nebula NGC 7027 are available, as well as a mathematical description of the brightness distribution of the nebula. The unknowns in the expression are optical depth and two temperature parameters. Results obtained from solving for the three unknowns using three simultaneous equations gives values of the three unknowns that are not physically realizable. This is partly due to the effect of incomplete sampling at the time when the data were gathered, and to the noise in the system. When using estimation theory it is possible to account for the effect of noise in the maps and solve for the three unknowns optimally in a least squares sense. The results for different estimation procedures will be presented. This material is based upon the work supported by the National Science Foundation under Grant No. AST-8717214. The Government has certain rights in this material.

03.11
A General Technique for Recovering High Angular Resolution Images from Unevenly-Spaced IRAS Data
J. A. Hackwell, L. M. Friesen, R. Canterna (The Aerospace Corporation), and G. L. Gradaelen (The University of Wyoming)

We have developed a general way of using a maximum entropy image recovery algorithm (Gull and Skilling 1984, IEE Proc. F, 131, 646; Skilling and Bryan 1984, MNras, 211, 111) on unevenly-spaced IRAS data. Our method uses a different response function and signal-to-noise ratio for each IRAS detector. The individual detector response functions, as measured by IRAS from scanning an unresolved point source, are used to form the general response matrix that maps every data point in the original unevenly-spaced data set into an evenly-spaced grid. This approach allows each point of the original data set to be weighted properly and still provide a displayed output image that is evenly spaced. We have been able to achieve 30-60 arcsecond resolution depending upon wavelength; this is a factor of 6-8 improvement over the survey data. We will show results for the double galaxy NGC 2992/2993, the spiral galaxy M51, and selected regions of star formation.

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03.12
An Instrument for High Angular Resolution, Hard X-Ray Observations of the Galactic Center
J. M. Davis, M. C. Weisskopf (NASA/Ms., all Space Flight Center), H. S. Hudson (University of California at San Diego), G. J. Hurford (Caltech)

Techniques for imaging x-rays with energies above 10 keV include coded apertures and modulation collimators. A prerequisite for high angular resolution in these instruments is a large separation between the masks used to modulate the x-rays and the detectors. An investigation, which has the potential for the acquisition of celestial images with arc second resolution, has been studied as one objective of a NASA program for the control of flexible structures in space. The program will use an existing 32 m extendable boom which will be pointed at a celestial target with an accuracy of one arc minute and a stability of a few arc sec/sec. It is proposed to mount both Fourier transform and coded aperture masks at the boom tip and to detect the modulated x-rays using position sensitive, fluorescence gated proportional counters. The xenon filled counters are sensitive to x-rays in the energy range 3-100 keV. The two telescopes will have a combined effective area of over 2100 sq cm, angular resolutions of 1 to 2 arc sec and 25 arc sec respectively and fields of view of up to 27 by 27 arc min. Preliminary mission planning is based on 24 hours (16 orbits) of observations with the galactic center as the primary target. The galactic center is particularly interesting because the large interstellar extinction limits the visibility of the high energy sources in soft x-rays. Other objects including the sun (as a precursor to the Pinhole/Occulter Facility) are possible targets for this and future missions.

03.13
The Goddard High Resolution Spectrograph (GHS) for the Hubble Space Telescope (HST): Pre-Launch Status
J. Brandt (LASP/UA, of Colorado and NASA/GSFC), D. Ebbets (NASA/UA), M. Carpenter (CASA/UA, of Colorado and NASA/GSFC) and S. Heap (NASA/GSFC) for the GHS Team.

The GHS is one of the first-generation science instruments for the HST. The status of the hardware as reported in BASS 19, No. 2, p. 757 (1987) is valid for Spring 1988 with the additions noted below. The light leak discovered during the 1986 thermal vacuum test has been corrected by the addition of an external baffle. Concerns over the specific potting material used in the GHS have been investigated. Laboratory tests of spare components with the same potting material have simulated several years of normal, flight operations and indicate that the potting material is inadequate. Tests of the carousel settling time have revealed occasional examples of anomalous behavior. For specific carousel locations and directions of approach, the carousel will not lock, and a new sequence needs to be written to over come this. Carefully crafted operating procedures should reduce the frequency of sticking to nearly insignificant levels. No rework of the hardware is contemplated. Barring unforeseen circumstances, the GHS is now in its flight configuration in the HST.

Supporting development of the GHS operations system at the Space Telescope Science Institute is a major ongoing effort. Our event-driven mode of operation strains the system, and joint efforts are underway to implement the event-driven capabilities of the GHS by launch. Also, we are working on essential improvements to the target acquisition part of the GHS flight software and plan to have these available by launch.

Finally, we are working on numerical tools to analyze the data. These include a better characterization of scattered light in the echelle mode and procedures using a known instrumental point spread function to deconvolve the GHS science data resulting in an enhancement of spectral resolving power by approximately a factor of 2.

03.14
A CCD-based Lunar Occultation Spectrometer
P. M. Rybicki (Univ. of WI-Whitewater)

Since the pioneering work of David Evans and R. Edward Nathan in lunar occultations at the University of Texas at Austin in the early 1970's, all observers interested in improving the lunar occultation data acquisition process have sought either simultaneous or independently monitored, separately filtered data channels, larger telescope aperture or some combination of these two. Both approaches have presented problems. First, the large apertures required for a telescope, the more of an occultation fringe will be mapped over its surface, reducing the observed modulation of the fringe at the telescope's focal plane. Reducing the diameter of the aperture perpendicular to fringe travel removes this problem but reduces the pupil's information-gathering area. Secondly, construction and operation of multiple data channels has been difficult because of the size and