high dispersion (25-28 Å/mm), taken with the 2.1-m telescope at Kitt Peak, have been used to derive the radial velocity gradients along the major and minor axes of M81. Measurements of Hα and the nearby emission lines of [N II] and [S II] generally extended to about 5 arc sec from the center of the nucleus. The average tilt of lines along the minor axis, 18.3 km s^{-1}(arc sec)$^{-1}$, is greater than the tilt of 8.5 km s^{-1}(arc sec)$^{-1}$ observed along the major axis. This result indicates that the ionized gas in the inner 50 pc of M81 is not undergoing pure circular motion in the plane. Interpreted in terms of a radial outflow of gas in the plane of the galaxy, the data indicate that about 0.01 M⊙ of ionized gas leaves the inner 50 pc of the galaxy in a year. This is similar to the gas flow out of the nuclear region of M31 (V. C. Rubin and W. K. Ford, Jr. 1971 Astrophys. J. 170, 25). Unlike the situation in M31 (H. M. Johnson 1961 Astrophys. J. 133, 309), no evidence is found for any systematic shift in the orientation of the isophotes near the nucleus. The M/L ratio and line-intensity ratios are also discussed.

02.05.10 No Redshifts in Quasi-Stellar Objects. Y.P. VARSHNI, Univ. of Ottawa.-Analysis of the strong emission-line data of 281 QSOs shows that these are consistent with the following three hypotheses: (1) There is no redshift, (2) The strength of the emission lines is due to laser action, and (3) The composition of the emission region of QSOs is approximately the same as that of normal stellar atmospheres. Search was made for common lines in QSOs and in laboratory observed laser lines in such atoms and ions, which have high abundance in stellar atmospheres. Twenty-four such wavelengths were found. A realistic model of the QSOs, based on these hypotheses is proposed. A QSO is a star with a rapidly expanding atmosphere, in which population inversion is occurring. This atmosphere can be approximated by a decaying plasma. Properties of such a plasma are reviewed. A given transition in an atom can undergo laser action only within narrow ranges of the electron density (n_e), electron temperature (T_e) and the density of the ground-state atoms (n(1)). n_e, T_e, n(1) plot is introduced to classify the QSOs. Consequences of the proposed model are discussed, taking the group consisting of 3C 191, PHL 938, PKS 0119-04 and BSO 6 as an example. Other similar groups are pointed out (e.g.,RS 23, PHL 1222, and 1548+115b). Intensity variations of the same line in different QSOs, and also in the same QSO, are shown to follow naturally from this model. Quantization in the redshift distribution is explained. Absorption spectra of QSOs are also discussed.

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03.01.09 Radio Properties of the Crab Pulsar: Where is the Emission Region Located? R. M. Price, M.I.T. & J. M. Sutton, U. of Sydney, Australia - Komesaroff (1971, Astrophys. Lett. 9, 195) has suggested a scattering mechanism to explain the existence and properties of the precursor in the pulse waveform of the Crab pulsar-NP0532. This paper extends the calculations of Komesaroff. The results indicate that the source of the radio emission is located near or at the central object rather than near the speed of light cylinder. The radio data used for the analysis gives improved values for the scattering of the pulsed emission by the interstellar medium. This allows a better determination of the spectral characteristics of the four features (precursor, main pulse, bridge, interpulse) of the Crab pulsar waveform. The absence of precursor features in other pulsars can be explained in terms of the absence of a sufficiently dense scattering medium in the region around the pulsar. This will be discussed in terms of the particle flux from the pulsar and the effects of the magnetic dipole radiation from the pulsar. This research is supported in part by the National Science Foundation.

03.02.09 A Model for Cassiopeia A Spectral Evolution. F. W. PETERSON, National Radio Astronomy Observatory.
- It has been pointed out, most recently by Dent, Aller, and Olsen (preprint), that the spectrum of Cas A shows a measurable flattening with time in addition to a secular decrease in flux. Over a wide range of radio frequencies covering about three decades of frequency, the spectrum of Cas A is represented remarkably well by a single power law, $S \sim \nu^{-\alpha}$ where S represents flux at frequency ν; the spectral index $\alpha = .792 \pm .006$ at epoch 1965 (Dent, Aller, and Olsen). The mechanism producing the flux is commonly accepted to be synchrotron radiation by electrons. If it is assumed that the relativistic electrons have a power law distribution in energies, $N \sim E^{-p}$, then the above flux-frequency relationship may be reproduced with $\alpha = (p-1)/2$. However, with this form for the electron energy distribution, there is no time dependence in α since p is constant. It might be that additional physical processes involved in the evolution of Cas A could account for the observed flattening of its spectrum with time. It is possible, though, to account for that evolution without recourse to other processes than synchrotron radiation (and the observed nebular expansion which is invoked to explain the secular decrease in flux). A different assumed distribution in electron energies, namely $N \sim E^{-2} \exp [a(P/E - p/b \sin^2\Theta)^r]$ where Θ is electron pitch angle, a and r are constants peculiar to the distribution, and p and b are low energy cut off and synchrotron break energy respectively, leads to a relationship between flux and frequency which closely approximates the observed relationship and also accounts for the observed spectral flattening.

03.03.09 **X-Rays from Hot, Dense Coronas. N. M. HOFFMAN, Washburn Obs. - The structure of stationary, spherically-symmetric, inviscid coronal winds, flowing outward from a gravitating body and heated at the base by an unspecified mechanism, has been studied numerically. The effects of energy conduction by electrons, heating by semi-relativistic protons, and cooling by bremsstrahlung are included. Magnetic field and rotational effects are neglected. The expanding gas is assumed to be optically thin to the cooling radiation. X-ray continuum spectra emitted by these model coronas have been calculated. The aim of this work is to describe the x-ray emitting region of compact galactic x-ray sources such as Scorpius X-1, through comparison with the shape of observed continuum spectra and with inferred values of the electron-scattering optical depth. Results will be discussed.**

03.04.07 Electron Densities, Radii and Masses of Planetary Nebulae. J. H. Lutz, Washington State University. - [O II] electron densities have been de-