ABSTRACTS

43.06 Sagittarian Positions from a Hot Young Pulsar. R. Brecher, A. Masticcheidis, Boston U. Observations of positron annihilation radiation coming from the galactic center direction have been made by several groups. These indicate that the line is at its rest wavelength with a width of less than 2.5 keV. A comparison of these observations indicates variability by a factor of 3 on a time scale as short as six months, and possibly an overall decrease in flux by a factor of 10 between 1971 and 1981. While a plausible picture has developed of the physical conditions in the actual annihilation region, no consistent model of the source of the positrons has been suggested to date which can account for all of the observed properties of the line radiation. We propose that the positrons are produced by collisions of fast electrons accelerated in the magnetic field of a rapidly rotating young pulsar with the thermal blackbody photon flux which must be radiated from the surface of such a newly formed neutron star. A hot, young pulsar with initial parameters similar to those deduced for the Crab pulsar ($t = 350$ sec, $B = 5 \times 10^{12}$ gauss, $T = 10^{7}$ K) will produce a positron flux consistent with that observed from the galactic center direction for a period of 10 - 100 years. After this time, fast electrons will form pairs primarily via interactions with the pulsar magnetic field at a greatly reduced rate. We stress that the new physical process considered here must occur in hot young pulsars. The statistical probability of finding such an object in the galactic center region is found to be reasonable. This work has been supported in part by NSF Grant AST-8020756 and NASA Contract NAG 8-415.

43.07 Particle Beams from Thick Accretion Disks. P. J. Wiita, U. Penn., R. Narayan, R. Uttayandha, Raman Research. The interaction of radiation and the surface layers of the funnel region of thick radiation pressure supported accretion disks is studied. We find that turbulent mixing of the surface layer with deeper regions in the disk can greatly reduce the particle velocities and luminosities achieved. On the other hand, an improved treatment of radiative acceleration and drag show how higher speeds and fluxes could be reached. For a specific funnel geometry we find that the particle luminosity ($L_p$) can range from 0.02 to 3 times the photon luminosity ($L_p$), depending sensitively on the sound speed in the funnel wall and upon the exact strength of the instability induced turbulent shear stress. In most cases we find $L_p \propto L_p$, implying that the particle luminosity can be very important for these active galactic nuclei models. However, we do find some cases with $L_p < L_p$, showing that current models of superluminal funnels need not always be inconsistent, as claimed earlier.

43.08 The Particle Spectrum Arising From Resonant Acceleration in a Turbulent Plasma. J. A. Eilek, NMINT, and R. N. Henriksen, Queens U. We consider relativistic particle acceleration by resonant Alfvén waves which are driven internally in a radio source from fully developed Kolmogorov fluid turbulence. We find that the self similar spectrum of Laconbe (1979), $I(p) \propto p^{-\alpha}$ with $\alpha = 4.5$, arises self consistently when this turbulent wave driving coexists with synchrotron losses. The coupling of the wave and particle distributions provides feedback which drives an arbitrary initial distribution to the form stable, self similar form. The model predicts that synchrotron radiation from a turbulent plasma in a radio source should evolve towards a spectral index, $0.5 < \alpha < 1.0$ in one particle lifetime, and also that the average spectrum of most sources should be in this range. The theory may also be applicable to other turbulent sites, such as cosmic ray reacceleration in the interstellar medium.

43.09 Emission Spectrum of Maxwellian Synchrotron Compton Sources. F. Takahara, Nobeyama Radio Observatory, U. Tokyo. Emission spectrum of a relativistic plasma with random magnetic fields is investigated in connection with compact radio-X-ray sources in quasars and active galactic nuclei. Numerical calculations are made for the electron temperature $T_e$, $T_e/m_c^2 \geq 100$ and the optical thickness to the Thomson scattering $\tau < 10^{-5}$ to $10^{-1}$. It is found that synchrotron radiation becomes optically thick up to the frequency $10^9$ to $10^4$ times the synchrotron frequency for the parameter range mentioned. These copious synchrotron photons are subsequently upscattered to high energies by Compton scattering. Spectrum of Compton scattered photons are calculated by the numerical integration of the formula with Klein-Nishina cross section. The spectrum consists of several broad components and extends up to the energy $3kT_e$. For $T_e \propto 1\text{keV}$, the Compton luminosity dominates the synchrotron luminosity. Generally bremsstrahlung is unimportant even if the magnetic field is as weak as below the equipartition value by several orders of magnitude. We briefly discuss applications to compact sources in active galactic nuclei.

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44.01 A Normal Incidence X-ray Telescope for Solar Studies. by L. Gold, R. Rosner, G. S. Vlahos, M. V. Zombeck, CFA; E. Spiller, J. Wilgus, SLH. We are presently constructing a telescope utilizing multilayer coatings to achieve high normal-incidence reflectivity at soft X-ray wavelengths. A prototype 3-inch mirror has been tested at B = 0.62 photon/m2, demonstrating the achievement of good reflectivity values and extremely high-quality imaging relative to grazing-incidence mirrors. We discuss the design of a rocket-borne telescope for solar studies, including expected performance specifications and an outline of the scientific objectives of the payload. The spectroscopic capabilities of the multilayer technique and applications to stellar coronal studies will also be discussed.

44.02 New Observations of the Extended Ultraviolet Corona. J. L. Kohl, H. Weiser, G. L. Withbroe, Harvard-Smithsonian Center for Astrophysics, B. R. Mink, High Altitude Observatory, and G. Noell, Arcetri Observatory. Ultraviolet spectroscopy of the solar corona out to