12.02 Self-Propagation and Broadening of Coronal Loop Transients, T. H. MONCHOOVIAS and R. A. FIELDER, Univ. of Illinois at Urbana-Champaign. We assume that white-light coronal loop transients are isothermal, material loops threaded by magnetic fields with both poloidal and toroidal components, and we calculate the dynamical evolution of such loops. The toroidal component of the magnetic field propels the top section of the loop outward against the Sun's gravitational field. The expansion velocity increases relatively rapidly near the solar surface, but flattens off farther out. The same toroidal field which is responsible for the propulsion of the loop tends to pinch the loop. However, this tendency is countered by the internal poloidal field. Solutions exist for which no pinching takes place below about 5R\_S. Thermal pressure is initially larger than the difference between toroidal and poloidal magnetic pressures, and causes a relatively rapid broadening of the loop's cross section. The broadening ceases typically when the top section of the loop is at about 4R\_S from the Sun's center. These calculations on loop expansion and broadening of coronal loop transients agree well with existing measurements.

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12.03 Are Coronal Loops Stable? S.K. ANTOCHOS, Stanford U.
In a previous investigation we found that the "quasi-static" models of coronal loops are linearly unstable to thermal perturbations. Two important assumptions in this investigation were that the base temperature of the static models was assumed to be above 10^6 K and that the perturbation heat flux vanished at the base. Recently, several authors have argued that if one considers different boundary conditions on the perturbation or if one includes cool chromospheric material in the static models, then the models become stable. We consider in detail the questions of the appropriate boundary conditions for the linear analysis, and we find that the recent results are due to the use of boundary conditions that are not self-consistent. When proper conditions are assumed, one finds that the models are unstable, independent of the amount of cool material at the base. Growth times for typical active region loop parameters are ~300 sec. We discuss the physical implications of these results.

12.04 Emission-Line Corona Observations from a High-Latitude, Gnomically Quiescent Prominence, K. H. LEGGETT, S.P.C., and Z. ZHANG, Nanjing, P.R.C.
Emission-line coronagraph observations of a high-latitude, gnomically quiescent prominence, with a height ~5 x 10^6 km, at wavelengths of H\textalpha, H\beta, He\textalpha, and He\textbeta, reveal faint, rapidly evolving coronal images corresponding to the location of the prominence. The difference between corresponding images at the two coronal wavelengths identifies the predominant source of radiation as coronal emission. From an initial, faint, diffuse image distribution, especially in the green line, the emission gradually becomes concentrated at locations corresponding to the edges of the prominence, over a period of several hours. Edge enhancement is interpreted as revealing the prominence-corona transition region, generally consistent with results inferred from EUV observations. However, high-temperature EUV coronal line observations (X \times 10^5 K) associated with prominences produce diffuse images, whereas the visible-line observations are characterized by exceptionally sharp boundaries. Implications relevant to different heating mechanisms are discussed.

12.05 A Remarkable General Property of the MHD Equations and Its Relation to Coronal Heating Mechanisms, R. C. TSINGAROS, Harvard-Smithsonian Center for Astrophysics.
It is shown that when the magnetic field and the fluid motions in an ideal magnetofluid have a translational symmetry then, apart from isolated topologies, invariance along this principal direction of the fields is a necessary condition for magnetohydrodynamic equilibrium. In well-behaved field topologies lacking this invariance, non-equilibrium is the result. This theorem is analogous to the well-established Taylor-Proudman theorem in fluid dynamics and runs parallel to Parker's theorem for the necessary conditions for equilibrium in magnetostatics. It appears then that topological non-equilibrium may indeed be the basis for the continuous activity of the variable hydromagnetic fields in the universe.

Solar scintillations in the frequency range from 20 Hz to 15KHz were recorded during the February 16, 1980 and July 31, 1981 total solar eclipses. The solid state photodetector system used can record fluctuations in light intensity as small as one part in 10^4 variation in background illumination. Eclipse shadow bands were clearly recorded during each eclipse and are compared. Furthermore, the eclipse shadow band recordings are compared, and found to be similar to solar scintillations recorded during an artificially eclipsed sun. The relationship between eclipse shadow bands and solar scintillations resulting from terrestrial atmospheric phenomena are discussed. (This material is based upon work supported by the National Foundation and Gettysburg College.)

12.07 Solar Rotation and Variability Observed in the Ca II K Line, S. L. REHL, APDL, Sacramento Peak Obs., S. F. WORDEN, UCLA - We report on chromospheric variability and solar rotation between 1976 and 1982 as evidenced in Ca II K line observations obtained at Sacramento Peak Observatory. The observations are made several times per month in integrated sunlight using the coudé-long horizontal Littrow spectrograph combination at the SPO Big Dome installation. The solar spectrum is recorded between approximately 389.5 nm and 396.4 nm in 6 x 10^-3 nm steps. Between 50 and 150 scans were typically recorded near local noon on each day observations were made. Good scans were aligned and averaged to form a daily mean scan. We report on observed changes in several K line parameters obtained from our daily