sources of the variations in these decay intervals are discussed.

It is suggested that a new dating method, similar to the Pb^{207} - Pb^{206} method and based on the two decay systems I^{129} - Xe^{129} and Pu^{244} - Xe^{136} , could be used to determine initial solar-system ratios of I^{129}/I^{127} and Pu^{244}/U^{238} , which would provide crucial tests of models of nucleosynthesis and the formation of the solar system.

The Critical Inclination Case of the Satellite Motion. YUSUKE HAGIHARA AND YOSHIHIDE KOZAI, *Smithsonian Astrophysical Observatory, Cambridge, Massachusetts*.—If the inclination of a satellite referred to the equator of the planet is near $63^\circ.4$, usual methods of successive approximation to solve the equations of motion fail because of a small divisor. However, it is shown that for this case the motion can be solved as functions of Jacobi's elliptic integral by applying the general theory of libration in the motion of asteroids and natural satellites.

If $J_2^2 + J_4$ is positive (J_2 and J_4 being coefficients of the second and the fourth harmonics in the potential), the pericenter of the orbit librates around either of its nodes, ascending or descending, which correspond to two of the four double points of the Hamiltonian. The motion near the other double points situated at the middle points of the two nodes is one of revolution or asymptotic at the double points.

If $J_2^2 + J_4$ is negative, the motion of the pericenter is of revolution or asymptotic near the former double points, and is of libration around the latter. By adding the third harmonic of the potential positions of the double points will be shifted a little.

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The Helium Flash in Population II Giants. R. HÄRM AND M. SCHWARZSCHILD, *Princeton University Observatory*.—The evolution of a star of 1.2 solar masses has been followed through the phase in which the helium burning begins, with the following results. The helium burning sets in when the temperature in the contracting core reaches about 80 million degrees. Owing to the high degeneracy in the core the new energy source does not cause an expansion but rather heating. The rise of the temperature further accelerates the helium burning and thus a thermal runaway occurs, as predicted by Mestel. This runaway terminates only when the core becomes nondegenerate. Subsequent helium burning causes rapid expansion and cooling.

At the peak of the helium flash the temperature reaches approximately 300 million degrees. The energy liberated at this peak corresponds to about 10^{12}

solar luminosities. Practically none of this energy penetrates the thermal blanket of the nondegenerate outer layers of the helium core. The evolution at the peak is so fast that the time interval between successive numerical models had to be reduced to as low as 2 sec. It appears uncertain whether the neglect of dynamical effects remains a reasonable approximation in this phase.

In the Hertzsprung–Russell diagram the star slides down the red-giant branch while the helium flash goes on in the interior.

The Radio Spectrum of Supernova Remnants. DANIEL E. HARRIS, *California Institute of Technology*.—Thirteen galactic radio sources, tentatively identified with supernova remnants, have been observed at 960 Mc. The resulting integrated intensity measurements together with results of other observers at various frequencies have been used to compute spectral indexes.

One of these sources, the Cygnus Loop, has been observed at Manchester at 408 Mc with a beam-width nearly equal to ours. From a detailed comparison of these results, we find that all parts of the Cygnus Loop have essentially the same spectral index, in spite of significant intensity variations of the optical and radio emission.

Optical observations of the Cygnus Loop are used to compute an expected radio emission from electron-proton collisions. These calculations suggest that less than 2% of the observed radio intensity is due to free-free emission.

Distances of the remnants and corresponding diameters are estimated from the assumption that the physical size of thin filaments and small knots is the same for all objects. The spectral index is then found to be a function of the diameter of the remnant, and we suggest an evolutionary effect of radio spectrum flattening with age.

Neutral Hydrogen in the Magellanic Clouds—A Repeat Survey Using a Multichannel Receiver and Digital Recording. J. V. HINDMAN, R. X. MCGEE, A. W. L. CARTER, AND F. J. KERR, *CSIRO, Radio-Physics Laboratory, Sydney, Australia*.—We have recently combined a pilot experiment in digital data recording with a survey of the neutral hydrogen in the Magellanic Clouds. Observations were made at meridian transit at intervals of 1° in declination, with a $2^\circ.2$ aerial beam and a 48-channel H -line receiver. The output from each channel was recorded in cyclic binary code on punched paper tape, and also on a conventional Speedomax chart, at the rate of one profile every two minutes.