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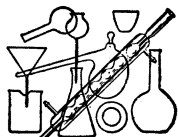
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... neutron stars

Under the magnetosphere is a region of supersolid. Here the matter of the star forms a crystal composed of nuclei with atomic numbers between 26 and 39 and atomic weights between 58 and 133 (SN: 6/27/70, p. 626).

After the density passes 10^{12} grams per cubic centimeter comes the third level, a collection of heavy nuclei that are exceedingly rich in neutrons, and are perhaps found nowhere else in nature.

The fourth circle comes at a density of 10^{14} grams per cubic centimeter. At this point the heavy nuclei begin to break apart because of so-called neutron drip; they have too many neutrons. The matter here can be regarded as a gas of neutrons, protons and electrons interacting by nuclear forces and according to the laws of nuclear physics. The whole region, Rhoades and Dr. Ruffini remark, can be regarded as a single giant nucleus containing approximately 10^{57} particles.

Finally, the fifth circle, the innermost core, is the domain of particle physics. Here the density is above 5×10^{15} grams per cubic centimeter. The kinetic energy of neutrons, protons and electrons is so high here that collisions among them continually create new particles. All the 1,432 known particles and resonances will be here, plus others as yet unknown to the laboratory. Dr. Hagedorn's equation of state applies particularly to this region, and to derive it he had to take into account the probabilities of producing all these particles out of all the others.

Study of the model of the neutron star in the light of this new equation of state indicates to the researchers that the innermost level is surprisingly soft. Physicists had expected that as the density increased, the matter would get more rigid. However, it does not. The softness is attributed to the activity involved in continually changing particles into different particles.

Rhoades and Dr. Ruffini find that the new equation of state does not significantly affect the critical mass that separates neutron stars from black holes. Even if they assume extreme values of temperature or rigidity, it does not change the value very much.

Current estimates of the critical mass depend on the mathematics used by different theorists. They range from 0.34 solar mass to 2 solar masses. If the lower figure is correct, there would be little chance of forming neutron stars. But any figure in the neighborhood of one or higher would allow a significant number to appear. Rhoades and Dr. Ruffini see no way of pushing the value above two so that even in the most favorable case for neutron stars many black holes would also form. □

films OF THE WEEK

COUNT TO TEN. 16mm, color or b&w, sound, 26 min. In three different public contact situations, the film illustrates typical problems representatives face when dealing with an emotional customer or member of the public. In each case, when the employe is judgmental, or fails to listen, or is defensive, he blocks communications and raises defenses. The scenes dramatize that when emotions are the strongest, it is most difficult to be problem-oriented, nonevaluative, and supportive of the other person. The film points out that too often, an employe makes a client feel that he is being controlled or manipulated. Consequently the client goes on the defensive and nothing is solved. Audience: business, industry. Purchase color \$375 or b&w \$250, and rental color only \$45. Preview color only \$15. From Roundtable Films, Dept. SN, 321 S. Beverly Dr., Beverly Hills, Calif. 90212.

Circle No. 147 on Reader Service Card

EVOLUTION OF LIFE SERIES. 16mm, color, sound, six films 11 min. to 13 min. each. A series of animated films tracing the evolutionary changes of life on earth from the origin of rocks and mountains to the coming of man, while detailing the significance of environment on changing life forms. It illustrates the evolution of earth's animal forms through the gradual, almost imperceptible time changes and the accompanying brusque, cataclysmic environmental changes. Titles include: The Origin of Rocks and Mountains; The Beginning and Development of Life; Life in the Early Seas: Invertebrates and Fishes; Expansion of Life on Land: Amphibians and Reptiles; The Rise of Mammals; and The Coming of Man. Audience: intermediate, junior high. Purchase and rental information from McGraw-Hill Films, Dept. SN, 330 W. 42nd St., New York, N. Y. 10036.

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THE HIGH: DRUGS AND YOU. 16mm, color or b&w, sound, 19 min. This film deals realistically with some of the problems in the use of drugs. Without sounding "preachy," it shows the hazards in a believable way through the experiences of six high school students, one of whom is a pusher. Because the film is not just another case history of someone, somewhere who "freaked out" or got hooked, but about students with whom the viewer can easily identify, it provides an excellent opportunity for discussion about drugs, their use, and the penalties and dangers in their use. Audience: high school, college. Purchase color \$240 or b&w \$120 from Coronet Films, Dept. SN, 65 E. South Water St., Chicago, Ill. 60601.

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PHOTOGRAPHY: ANATOMY OF CAMERA AND FILM. 16mm, color, sound, 12 min. Presents the basic elements and operation of the photographic camera and film. The concepts are presented in a precise visual and narrative presentation. It includes such concepts as: Film is a material which turns dark in the presence of light; the unit of measurement for film sensitivity is ASA; a doubling of the film's ASA number indicates a doubling of the film's sensitivity to light; a shutter speed of 1/25th second allows twice as much light to reach the film as 1/50th of a second; the f/STOP is determined by the distance from the center of the lens to the image plane, which is called the focal length, and the diameter of the effective lens opening. Audience: high school, junior college. Purchase \$140 from Charles Cahall Associates, Dept. SN, P.O. Box 3220, Hollywood, Calif. 90028.

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Listing is for readers' information of new 16mm and 8mm films on science, engineering, medicine and agriculture for professional, student and general audiences. For further information on purchase, rental or free loan, write to distributor or circle the appropriate number on the Reader Service Card.