

PHYSICS

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Abstracts

In Situ Measurements of Cutaneous Fluorescence. TORSTEN ALVAGER, WALTER X. BALCAVAGE and WEICHEN TU*, Department of Physics and Terre Haute Center for Medical Education, Indiana State University, Terre Haute, Indiana 47809.——In situ fluorescence from skin of rats and humans has been studied using a newly developed light guide method. The technique is of importance as a possible diagnostic tool, since pathological states in biomaterial are often accompanied by the formation of tissue areas with altered fluorescence properties not necessarily caused by local phenomena. To obtain a first view of the possible use of this biophysical method, the study has been restricted to observations of only two fluorophores: proteins and so-called age pigments at excitation wavelengths 295 nm and 398 nm respectively. Results from measurements on humans as well as a series of observations on rats as a function of age will be discussed.

Production of artificial spin centers on chars. S. MROZOWSKI, Department of Physics and Astronomy, Ball State University, Muncie, Indiana 47306.——It was previously shown by several people that artificial spin centers (A-centers) can be made on chars and carbon blacks, by heating these materials to 700-900° in atmospheres of various gases under high pressure. The author has found that in heating a polyvinylidene chloride (PVDC) char reacts with its own evolved gas, even at quite low pressure, producing A-centers. In this work gas evolved from PVDC (mostly a mixture of HCl and Cl₂) was used to make A-centers on variously heattreated sugar chars and P33 carbon blacks. The production of A-centers and their destruction by thermal anneal in vacuo were studied; it was found that such A-centers can be made only as long as a carbon contains on peripheries some other organic components (H, N, O, etc.). Temperature dependence of the ESR absorption, its separation into air sensitive and air insensitive components and other effects will be discussed.

IUE Satellite Observations of Several Optically Violent Extragalactic Radio Sources. ROGER L. SCOTT, Department of Physics and Astronomy, Ball State University, Muncie, Indiana 47306, KAREN R. HACKNEY and RICHARD L. HACKNEY, Department of Physics and Astronomy, Western Kentucky University, Bowling Green, Kentucky 42101.——The IUE satellite is being used to study several BL Lacertae type objects in the ultraviolet below atmospheric cutoff. BL Lacertae objects exhibit the most violent optical and radio variability of the quasar class of objects. These rapid variables may represent a transitional phase between so called "peculiar galaxies" and the

quasar phenomenon. A brief discussion of preliminary results and instrumentation will be given. The observations were made at Goddard Space Flight Center and were supported by NASA Grant NSG 5238.

A Microcomputer Based Electronic Kinetic Sculpture. B. G. FORDHAM and G. P. THOMAS, Department of Physics and Astronomy, Ball State University, Muncie, Indiana 47306.——An SDK-85 microcomputer was programmed to control an incandescent light and analog sound source system, that form the nucleus of an optical-acoustical kinetic sculpture piece. Physical design, construction, operation, and control of this sculpture will be discussed with emphasis on such topics as the need for the advantage of computer control and interfacing details.

Using a Kim-1 Microprocessor as a Data Logger for Temperature Measurements in the Real World. VINCENT A. DINOTO, JR.——A brief discussion of a 6502 based microprocessor system for monitoring temperatures in the real world and store data over a short period of time. The 6502 based Kim-1 is interfaced to 3911 temperature probes which are frequency dependent with temperature. The software controlling programs can be designed to monitor as many as 15 probes or as few as one, with our applications we will not be using more than 8. The probes are calibrated independent of each other and each probe has its own linear calibration curve over our temperature ranges. Each calibration curve is repeatable for that probe. The probes have many real world applications with river temperature monitoring and energy losses being just two that are currently being tested.

Thermal Analysis of a Wind-Supplemented Residential Hot Water System. MICHAEL D. LOYD and RONALD M. COSBY, Department of Physics and Astronomy, Ball State University, Muncie, Indiana 47306.——A wind-supplemented residential hot water system was analyzed with general conditions established under which a wind-thermal transducer provides a useful heat source for this application. Example data was generated using a computer program modelling a vertical, composite cylindrical water tank simultaneously experiencing convective heat loss and wind-derived heat input under a variety of ambient conditions. Parameters varied included insulation thickness and quality, windmill size and conversion efficiency, and ambient windspeed and temperature. For appreciable heat gain in a well-insulated storage tank, an average windspeed greater than about 6 m/s was found necessary for a rotor with diameter 3.6 m and an overall efficiency of 0.25.