Arnold model (Reedy and Arnold, 1972). Also both calculation and measurement of krypton profiles in St. Severin are in progress. Our present interest concerns iron meteorites, in which target-elements for producing $^{78-86}$Kr lie in the $Z_T$ = 40 to 47 region and mainly high energy (E $\geqslant$ 100 MeV) protons or neutrons are effective. We first developed new systematics for spallation reactions in Zr to Ag targets that give significantly better results than the original Rudstam formula (Rudstam, 1966). Then we fitted the differential flux $\phi(E,x,R_E) = k(x,R_E)\times[\alpha(x,R_E) + E]\times\times(-2.5)$ in iron meteorites, following the general procedure of Reedy *et al.* (1979) and Bhandari and Potdar (1982) for chondrites. The spectral hardness parameter $\alpha$, for a given preatmospheric radius $R_E$ was fitted to the depth profiles of cosmogenic $^{38}$Ar when available.

Exposure ages were taken from Signer and Nier (1962) and Voshage and Feldmann (1979).

We selected $^{38}$Ar because it is produced from Fe and Ni targets only, whereas $^{21}$Ne is produced also from S and P, target-elements that are not homogeneously distributed in iron meteorites. However $^{21}$Ne profiles were used to check the $R_E$ values and a general agreement was observed.

Compared to cosmogenic krypton deduced by Munk (1967) in om II D Carbo and om III A Costilla Peak, our Grant-like flux distribution combined with our new spallation formula yielded a better than 10% agreement for 78/83, 80/83, 82/83 and even 84/83 (in Costilla Peak) isotopic ratios. However calculated production rates are too high by a factor of 2 to 3, that could be explained: i) by experimental uncertainties on cosmogenic $^{38}$Ar and $^{83}$Kr determination, ii) by the non homogeneous distribution of Mo, Ru, Rh and Pd target-elements for Kr in iron meteorites (Jochum *et al.*, 1980).

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## ELEVATED CONCENTRATIONS OF COSMIC DUST IN WISCONSIN STAGE POLAR ICE

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The abruptness with which global climatic changes have occurred during the Pleistocene Epoch has long been a puzzle, climatic flips transpiring within a period of 100 years or less. Evidence is presented here indicating that at least one such transition, the ending of the Last Ice Age, occurred in connection with a substantial increase in the concentration of cosmic dust in the Solar System. Using the neutron activation analysis technique, 12 dust samples filtered from polar ice (Camp Century and Byrd Station ice cores) have been analyzed for 15 elements. The concentrations of Ir and Ni in the ice were found to be from one to two orders of magnitude higher during the Late Wisconsin portion of the Last Ice Age as compared with present Holocene levels, implying that at that time cosmic dust was being deposited on the Earth's surface at an accelerated rate. In the Camp Century ice core Ir was found to reach concentrations of 15-85 pg/lt of ice on six occasions between an ice core depth of 1215-1279 meters (14,200-19,700 BP). Planetesimal impacts and close encounters with cometary tails may be ruled out as the source of the iridium since such events would not be expected to occur frequently enough. Instead, it is suggested that these anomalously high elemental concentrations reflect higher space concentrations of cosmic dust in the interplanetary environment.

At a depth of ~ 1235 meters in the Camp Century ice core (15,400 BP) the concentrations in ice of several elements were found to increase significantly within a span of 1 meter of core depth (~ 100 year interval): Sn by > 27,000 times (to an enhancement factor [EF] of 190,000) Ag by > 218 times (EF = 3400), Au by > 21 times (EF = 3000), Ir by > 74 times (EF = 130), and Ni by > 17 times (EF = 7). Coincident with this increase a decrease was found in the concentrations of several elements more commonly found in terrestrial material, e.g., La, Ce, and Tb. The data are consistent with a three component composition for this anomalous sample: ~ 18% windblown continental dust, ~ 7% C-1 chondritic material, and ~ 75% material of anomalous composition (rich in Sn, Sb, Au, and Ag). An extraterrestrial, possibly interstellar origin is suggested for the tin-rich component.

The above geochemical analysis was undertaken to test the hypothesis that a shell of Galactic cosmic ray electrons propagating relativistically from the Galactic Center impacted the solar vicinity about $10^4$ years ago, raising the cosmic ray background energy density by ~ $10^3$ fold (LaViolette, 1983). Cometary material residing in the vicinity of the heliopause sheath would have become vaporized during such an event, and the resulting nebular cloud would have been propelled inward, swamping the solar wind and solar radiation expulsion processes. Optical depths in the outer portion of the Solar System could have reached as high as $\tau \sim 1$ causing light to become backscattered and hence producing an increase in the solar constant. Other effects must also be considered such as possible alteration of the Sun's spectrum by intervening dust and elevation of the Earth's stratospheric albedo.

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## ON THE METEORITES WITH MULTI-STAGE IRRADIATION BY GALACTIC COSMIC RAYS

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It is given the survey of the meteoritic data which are shown multi-stage irradiation of some meteorites by galactic cosmic rays. The first detailed investigation of that question has been carried out for the iron meteorite Sikhote Alin (Kolesnikov *et al.*, 1972). According to data of various authors the radiation age values for that meteorite are limits of (60+1400) m.y. We have obtained the radiation age values for ten individual specimens of that meteorite by the $^{38}Ar$-$^{39}Ar$ method (Kolesnikov *et al.*, 1972; Fisenko and Kolesnikov, 1971). The results have shown that the radiation age vaues of the different specimens lie into interval from 70 to 540 m.y. It is obvious that a parent body of the Sikhote Alin meteorite had been undergone destructions in the space. The cosmic history of that meteorite can be represented in the form of the following scheme: (1) the meteorite had been formed as the cosmic body 470 m.y. ago, (2) it had been undergone a destruction $\lesssim$ 70 m.y. ago and (3) only a some part of primary cosmic body had fallen out on the earth surface. On the basis of these data has been proposed the scheme of possible situations of the investigated specimens into preatmospheric body.

For the mesosiderite Veramin has been obtained the extraordinary high value of the $^{39}Ar/^{36}Ar$ ratio in the metal phase owing to the high activity of $^{39}Ar$ (Begemann *et al.*, 1976). It shows on a episodical act in the late radiation history of that meteorite (for last 500,000 years). For the Dhajala chondrite has been obtained the different radiation ages by the $^{21}Ne$ method ($T_{rad} = 6.0 \pm 0.3$ m.y.) and by the $^{38}Ar$-$^{39}Ar$ method ($T_{rad} = 17 \pm 2$ m.y.). The investigations of radiation history about 200 chondrites by means of the analysis of the VH nuclei track densities and the noble gas contents (Potdar, 1981) show that the meteoritic material at the parent body stage.

All these data show that meteorites have the relics of fragmentation processes which had taken place at different stages of their history.

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## SEARCHING FOR CHROMIUM ISOTOPIC ANOMALIES IN ALLENDE INCLUSIONS

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Recently there have been several so far unsuccessful searches for the evidence of radio-nuclide $^{53}Mn$ in $^{53}Cr$, and $^{54}Cr$ anomalies predicted from the existing anomalies in $^{48}Ca$ and $^{50}Ti$ (Lee and