that the Co ion behaves somewhat differently than the Fe ion when alloyed with Pd, where the field at the Fe^{57} nucleus is lower at smaller concentrations of Fe than in pure Fe [2].

The large value of H_{eff} is apparently connected with the large local moment at the impurity ferromagnetic Co atom (at a concentration of 0.3 at.% Co in Pd, the local moment per atom of Co is ~9 μ_B [1]). On the other hand, the increase of H_{eff} at the Co nucleus in the investigated alloy can be due to the change in the contribution of the spin density due to the conduction s-electrons, compared with metallic cobalt.

It is of interest to determine the dependence of H_{eff} on the Co concentration. Work in this direction is now in progress.

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MEASUREMENT OF THE CROSS SECTIONS OF ION-ATOM COLLISIONS AT LOW ENERGIES BY THE METHOD OF OVERTAKING BEAMS

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Measurement of the cross sections of ion-atom collisions at energies below ~100 eV by customary methods is a complicated matter, principally because the guidance of the ion beam through the apparatus becomes much more difficult in this energy region, and the scattering of the ion beam by the target exerts a greater influence on the measurement results. An experimental solution free of these shortcomings is nevertheless possible. To this end, the two colliding particles should have sufficiently high energy in the laboratory frame. To obtain low interaction energy, on the other hand, all that is needed is a small difference in the particle velocity at the instant of collision. Conditions of this kind can be obtained when monochromatic particle beams cross at a small angle ("overtaking beams"). Since the absolute difference of the energies of the colliding particles always exceeds the interaction

energy in this case (the excess increasing with decreasing interaction energy), measurements for rather low energies are possible. Thus, in a particular case, at zero collision angle, the absolute energy difference of the colliding particles $\Delta T = |T_1 - T_2|$ exceeds the interaction energy $T = |\sqrt{T_1} - \sqrt{T_2}|^2$ by a factor $\Delta T/T \approx 2\sqrt{T_1/T}$ with $T \ll T_1 \approx T_2$. For $T = 1$ eV and $T_1 = 1$ keV we get $\Delta T \approx 60$ eV. An idea similar to that described here was recently advanced in [1].

If the study concerns collisions between atoms and ions of the same substance, we can operate with one monokinetic atom-ion beam. When such a beam is guided through a region with reduced potential, the required energy shift ΔT can be produced.

We have constructed a setup based on the described principle, and carried out preliminary measurements. The process chosen for investigation was resonance charge exchange of protons with hydrogen atoms. To produce the proton beam we used an ion source of the oscillating type. The mixed atom-ion beam was obtained by partial charge exchange of a beam of protons, which in our experiments had an energy $T_1 = (1150 \pm 9)$ eV, with a gas target ahead of the entrance to the collision chamber. The collision chamber was insulated and was under a potential decelerating the protons to an energy T_2. By the same token we produced, first, the energy shift between the protons and the atoms in the beam, needed to obtain a definite interaction energy, and second, a fixed interaction length such that on leaving the collision chamber the protons which did not enter in the reaction acquired again an energy T_1. On the other hand, the protons produced from the atoms as a result of the charge exchange in the collision chamber (and consequently having in this chamber an energy T_1) acquired on leaving the collision chamber an additional energy, which made it possible to separate them subsequently from the total particle stream and to register them. The cross section of the process was calculated from the current of these newly produced protons (for known characteristics of the interaction beams and collision-chamber dimensions).

The ions with energy T_1 could be produced in the collision chamber not only by charge exchange of the atoms with the protons (effect), but also as a result of other processes, predominant among which is stripping of the atoms by the residual gas (background). In order for the background not to exceed the effect, the pressure of the residual gas in the collision chamber should in our conditions be not worse than $\sim 3 \times 10^{-10}$ mm Hg.

The cross section obtained in our preliminary experiment for the resonance charge exchange of protons with hydrogen atoms, $\sigma_{10} = (5.45 \pm 1.35) \times 10^{-15}$ cm^2 at an energy $T = (31.8 \pm 3.6)$ eV, is in satisfactory agreement with the only experimental results obtained for this interaction in this energy range [2].

Preliminary experiments have shown that the difficulties arising when this method is applied to the study of ion-atom collisions are surmountable. The method of overtaking beams makes it possible to investigate ion-ion and ion-atom collisions for different vapors and gases (both atomic and molecular), and is therefore quite promising for the study of ion-atom collision processes at low energies, down to fractions of an electron volt.

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BARIUM STANNATE - A SOURCE FOR THE MEASUREMENT OF THE MOSSBAUER EFFECT ON Sn^{119}

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The features of resonance absorption of 23.8-keV γ quanta from Sn^{119} make possible extensive use of the Mossbauer effect on tin for scientific research and technical purposes. The most frequently used sources of recoilless γ quanta are tin oxide SnO_2 or magnesium stannide Mg_2Sn.

An emitter based on SnO_2 is characterized by a high probability of resonance emission of γ quanta even at high temperatures ($f_{293°K} \cong 0.55$, $f_{600°K} \cong 0.42$ [1]). However, the SnO_2 emission line is not a singlet, but a doublet with splitting $\Delta \cong 0.5$ mm/sec [2].

The spectrum of the Mg_2Sn source has the form of a Lorentz unbroadened curve [3]. Its resonance emission probability displays a strong temperature dependence. The low value $f = 0.28$ at room temperature [3] makes it necessary to cool the source to low temperatures during the measurements, thus making the experiment more difficult.

It would be very convenient to use for many scientific and technical purposes an emitter which possesses simultaneously a high probability of the effect at room temperature and a singlet unbroadened resonance-emission line.

Interest attaches in this respect to the stannates of barium, strontium, and calcium. Owing to the high symmetry of the crystal lattices of these substances (perovskite structure), the influence of the quadrupole interaction on the width of their spectral lines should be small.

The gamma resonance in these compounds was investigated earlier [4], where it was noted that the probability f of the effect has a weak temperature dependence and is large at room temperature. The observed absorption spectra of these stannates constitute single lines with width almost double the natural width.

Since no account was taken of the doublet character of the tin-dioxide spectrum in the reduction of the data of [4], where an SnO_2 source was used, we have repeated the measurements of the γ resonance with these stannates. The use of an Mg_2Sn source in conjunction with a resonance counter [5] has made it possible for us to determine with great accuracy the form of the spectra of $BaSnO_3$, $SrSnO_3$, and $CaSnO_3$. Since the use of a resonance counter reduces the