prediction of the observed polarization as a function of wavelength.

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Measurements of the Influence on the Fountain Effect of He^3 Dissolved in He^4

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HELIUM gas containing 0.23 percent He^3 was condensed in a vessel of approximately 1 cm^3 capacity, which was connected to a second vessel by means of a narrow slit above the liquid level. The slit was almost gas-tight but open to the helium film. The pressure inside either of the two vessels, which were surrounded by a helium bath, could be measured against the vapor pressure of the bath by means of two differential oil manometers. In the second vessel there was a heating coil.

It is well known that in pure He^4 a fountain pressure (Δp) occurs between two vessels when a temperature difference (ΔT) is established, the contact being by way of the helium film. When ΔT is a few hundredths of a degree, Δp corresponds already to about 1 meter of liquid helium, hence the colder vessel in our arrangement will be emptied completely. With this apparatus, which is like that used by Daunt *et al.*,[1] in similar experiments, we found that the normal fountain effect can be compensated by dissolving He^3 in the colder vessel. Preliminary investigations at 1.38°K show that the "reduction" of the fountain pressure is approximately ρRTX, in which X is the He^3 concentration in the liquid in the colder vessel, the warmer vessel containing no He^3. The quantity ρRTX is the value of the osmotic pressure (P) for a dilute He^3 solution according to Van't Hoff's law. The same reduction, P, in the fountain pressure may be expected to a first approximation from the two-fluid model, if one assumes that the He^3 dissolves in the normal fluid only. According to the formulas given by De Boer and Gorter[2] (case A) the gradient of X gives rise to a gradient in x, the concentration of the normal fluid. In this picture the normal fountain effect is due to a gradient of x and this gradient is decreased by the gradient in He^3 concentration.

The values of X were derived from the measured values of the excess vapor pressure in the colder vessel due to the presence of He^3 in the vapor. This excess gives the concentration in the vapor; by measuring the height of the liquid level to obtain the volumes of liquid and vapor, we could then calculate X, the concentration in the liquid. The second column of Table I gives the values of the fountain pressure derived from the measured ΔT values using dates from Meyer and Mellink,[3] (the difference of the levels in the two vessels and the difference in vapor pressure above the two liquids can be neglected in first approximation in comparison with the fountain pressures).

Columns 4 and 5 of Table I give the calculated relative concentration c_V and c_L of He^3 in He^4 in the vapor and liquid respectively. The ratio c_V/c_L should be 300 at this temperature according to earlier measurements,[3] however, in these experiments we did not prevent the film creep circulation and did not stir the liquid as formerly, so that we are not surprised by these lower values.[4]

TABLE I. Measurements on the fountain effect.

ρRTX (mm Hg)	P (mm Hg)	v_{liq} (mm^3)	$c_V \cdot 10^2$	$c_L \cdot 10^3$	c_V/c_L
3.3	3.2	54	11	1.1	100
4.2	4.1	52	9	1.4	64
4.6	5.6	28	13	1.6	81
5.4	5.8	33	9.5	1.8	53
~8	8.5	~5	16	2.2	73

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Results at other temperatures will be published in Physica 's-Grav., when the accuracy of the measurements has been improved by a slight modification of the apparatus.

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On the Determination of the Relative Positron Activity of Cu^{64} in a Source of Cu^{61}

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PREVIOUS studies[1,2] of the positron spectrum of Cu^{61} have been reported under the assumption that any other activity in the source is of negligible proportions. This has been borne out through the fact that half-life measurements made at different parts of the spectrum have indicated, within experimental error, a single value of 3.33 hours, corresponding to the half-life for Cu^{61}. However, since these sources were prepared by deuteron bombardment of nickel it is quite possible that a certain amount of Cu^{64} was produced from the 1.16 percent abundant Ni^{64} isotope by a $(d,2n)$ reaction. The purpose of this discussion is to set an upper limit on the amount of positron activity which could have been attributed to Cu^{61}.

In order to determine the amount of Cu^{64} present in a given sample the decay of the Auger electrons[3] was observed by means of a lens-type magnetic spectrometer over a period of more than 24 hours following the removal of the nickel target from the cyclotron. Copper was separated by means of the electrochemical process previously described.[1]

The concentration of Auger electron energies into a small interval is advantageous for this experiment. One does not need a source of very high intensity in order to have an appreciable counting rate above background even for the very weak Cu^{64} activity. In addition the relative activity of Cu^{64} to Cu^{61} as measured by the K-capture process is larger than the corresponding ratio of positron activities. The lower intensity activity can thus be more easily observed.

If only the 3.33 hour Cu^{61} activity were present, correction of the experimentally observed data to an initial time should always lead to an Auger line whose intensity is constant. Correction of the data during the initial stages of the decay gave this result. However, as time progressed, it was found that the 3.33 hour half-life correction gave ever increasing intensities for the Auger line at the initially chosen time. The assumption of the existence of a small amount of a second activity having a half-life of 12.8 hours could however account for the decay of the sample as observed.

When corrected to the end of the $2\frac{1}{2}$ hour period of cyclotron bombardment the Auger line was found to have consisted of 99.23 percent of the 3.33 hour Cu^{61} and 0.77 percent of the 12.8 hour Cu^{64}.