topic and helped by many stimulating and valuable discussions.

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[8] These notations agree with the notations of Jost and Corinaldesi (reference 2), except that these authors define the classical electron radius in Heaviside units; that is, in our notation their result is to be multiplied by $16\pi^2$.

Local Production of the Penetrating Particles in Extensive Showers

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IN a previous letter[1] we reported that associations occur in the side distribution of the penetrating particles of extensive showers, and we inferred therefrom that the penetrating particle are partly produced in the absorbers, and in groups. A similar result was obtained by Broadbent and Jànossy,[2] while Cocconi and Greisen[3] and Treat and Greisen[4] have recently disagreed with our conclusion.

Further examination of our data confirms our earlier belief, and suggests some explanation for resolving the disagreement.

Indeed, the experimental layouts were rather different: the results of Broadbent and Jànossy, and ours, are obtained with a large amount of absorber above the counters (30 cm lead, and 30 cm lead or 10 cm lead +30 cm iron, respectively); moreover, Broadbent and Jànossy used a large unshielded counter area, so that extensive showers with low mean density had a very high probability of being detected (e.g., for a shower of 10 particles/m^2 the probability was ∼0.9). On the contrary, Treat and Greisen employed a comparatively small unshielded counter surface (e.g., for a shower of 10 particles/m^2 the probability was $\sim 10^{-3}$), and only a 15.5-cm lead absorber. Cocconi and Greisen had an intermediate experimental arrangement at sea level.

TABLE I. An example from our experimental results of the dependence of associations on the extensive shower density. The same notations of our previous letter are used, and only the shielded counters P_1, P_3, F_1, F_3 are taken into account. Column (1): order of the coincidences between the unshielded counters. Column (2): number of coincidences between at least the two counters F_1, F_3 and the showers of column (1). Column (3): number of coincidences between at least the two counters P_1, P_3 and the showers of column (1). Column (4): sum of column (2)+column (3). Column (5): number of coincidences between one counter in the set X+one counter in the set Y, and the showers of column (1). In column (4) and (5) are considered the implications of all complex events: for instance, a coincidence $F_1+F_3+P_1+P_3$ contributes two events to column (4) and four events to column (5). Column (6): ratio column (4)×2/column (5); obviously this ratio indicates the degree of association: its value would be the unity for no association. The factor 2 takes in account the different probability of obtaining the coincidences of column (4) and column (5).

(1)	(2)	(3)	(4)	(5)	(6)
$A_1+A_2+B+C+D+L+M+N$	21	15	36 ± 6	53 ± 8	1.36
A_1+A_2+at least one of the counters B, C, D, L, M, N	41	40	81 ± 9	85 ± 10	1.91
Time (minutes)		20,690			

Our disposition,[1] which employed self-recording counters, points out a dependence of the associations on the extensive shower density. We have observed (see Table I) that the associations occur essentially in the showers of low average density. This result may explain the observed experimental differences.

Several arguments confirm the opportunity of employing large unshielded counter surfaces and thick absorbers in these measurements.

A complete report is being submitted to the "Nuovo Cimento."

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Nuclear Moments of Silver

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THE Ag*I* resonance line $5s\,^2S_{\frac{1}{2}}-5p\,^2P_{3/2}{}^0$ (3281A) has been excited in an atomic beam light source and its hyperfine structure resolved with an aluminium-coated Fabry-Perot etalon. The structure observed agrees with that reported by Jackson and Kuhn[1] from absorption measurements.

Spectrograms were taken with 2-, 4-, and 5-cm etalons. The pattern obtained with the 2-cm etalon showed two components due to magnetic h.f.s. with the isotopic components unresolved. The 4-cm pattern showed two strong components just resolved and two weak ones well resolved. With the 5-cm etalon the resolution of the strong components was better, but as expected the magnetic structure due to the $^2P_{3/2}$ level was not resolved. The relative wave numbers of the four components in decreasing order are: (*a*) 0.000, (*b*) −0.013, (*c*) −0.055, (*d*) −0.077 cm^{-1}. The relative intensities of these components, corrected experimentally for self-absorption in the atomic beam are: $(a):(b)=1.00:1.05\pm0.03$; $(c):(d)=1.05\pm0.03:1.00$; $(a)+(b):(c)+(d)=1.00:0.33\pm0.02$. These values and the recent abundance ratio[2] of the silver isotopes agree with the assignment of components (*a*) and (*d*) to Ag^{109} and components (*b*) and (*c*) to Ag^{107}, and show that $I=\frac{1}{2}$ for each isotope. The isotope shift is very small, 0.004 cm^{-1}, in agreement with the conclusions of Jackson and Kuhn.

The nuclear magnetic moments of the two isotopes have been evaluated using the Goudsmit[3] formula with the addition of the Fermi-Segrè[4] correction factor determined from a Rydberg-Ritz formula. This correction which was not applied by Jackson and Kuhn is 23 percent. The nuclear magnetic moments are negative and $\mu(\text{Ag}^{107})=-0.084$ and $\mu(\text{Ag}^{109})=-0.155$ nuclear magneton.

A correction for the finite size of the nucleus[5] raises these values about 2 percent, giving finally $\mu(\text{Ag}^{107})=-0.086$ and $\mu(\text{Ag}^{109})=-0.159$ nuclear magneton. This correction will be discussed in a forthcoming paper by two of the authors.

The structure of the $5s\,^2S_{\frac{1}{2}}-{}^2P_{\frac{1}{2}}$ transition (3383A) confirms these conclusions.

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** Holder of a fellowship from the National Research Council of Canada.

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