Public letter to the group of the Radioactives at the district society meeting in Tubingen:

Physikalisches Institut
der Eidg. Technischen Hochschule
Zurich

Zurich 4, December 1930
Gloriastr.

Dear Radioactive Ladies and Gentlemen,

As the bearer of these lines, to whom I graciously ask you to listen, will explain to you in more detail, how because of the ‘wrong’ statistics of the N and 6 Li nuclei and the continuous \( \beta \) spectrum, I have hit upon a desperate remedy to save the ‘exchange theorem’ of statistics and the law of conservation of energy. Namely, the possibility that there could exist in the nuclei electrically neutral particles, that I wish to call neutrons, which have spin 1/2 and obey the exclusion principle and which further differ from light quanta in that they do not travel with the velocity of light. The mass of the neutrons should be of the same order of magnitude as the electron mass and in any event not larger than 0.01 proton masses. – The continuous \( \beta \)-spectrum would then become understandable by the assumption that in \( \beta \)-decay, a neutron is emitted in addition to the electron such that the sum of the energies of the neutron and electron is constant. Now the question that has to be dealt with is which forces act on the neutrons? The most likely model for the neutron seems to me, because of wave mechanical reasons (the details are known by the bearer of these lines), that the neutron at rest is a magnetic dipole of a certain moment \( \mu \). The experiments seem to require that the effect of the ionization of such a neutron cannot be larger than that of a \( \gamma \)-ray and then \( \mu \) should not be larger than \( \text{e}^\#10^{-13} \text{ cm} \).

For the moment, however, I do not dare to publish anything on this idea and I put to you, dear Radioactives, the question of what the situation would be if one such neutron were detected experimentally, if it would have a penetrating power similar to, or about 10 times larger than, a \( \gamma \)-ray.

I admit that on a first look my way out might seem to be unlikely, since one would certainly have seen the neutrons by now if they existed. But nothing ventured nothing gained, and the seriousness of the matter with the continuous \( \beta \)-spectrum is illustrated by a quotation of my honored predecessor in office, Mr Debye, who recently told me in Brussels: “Oh, it is best not to think about it, like the new taxes.” Therefore one should earnestly discuss each way of salvation. – So, dear Radioactives, examine and judge it. – Unfortunately I cannot appear in Tubingen personally, since I am indispensable here in Zurich because of a ball on the night of 6/7 December. – With my best regards to you, and also to Mr Back, your humble servant.

W. Pauli

(Editor’s Note: Pauli’s ‘neutron’ was later named ‘neutrino’ by Fermi).