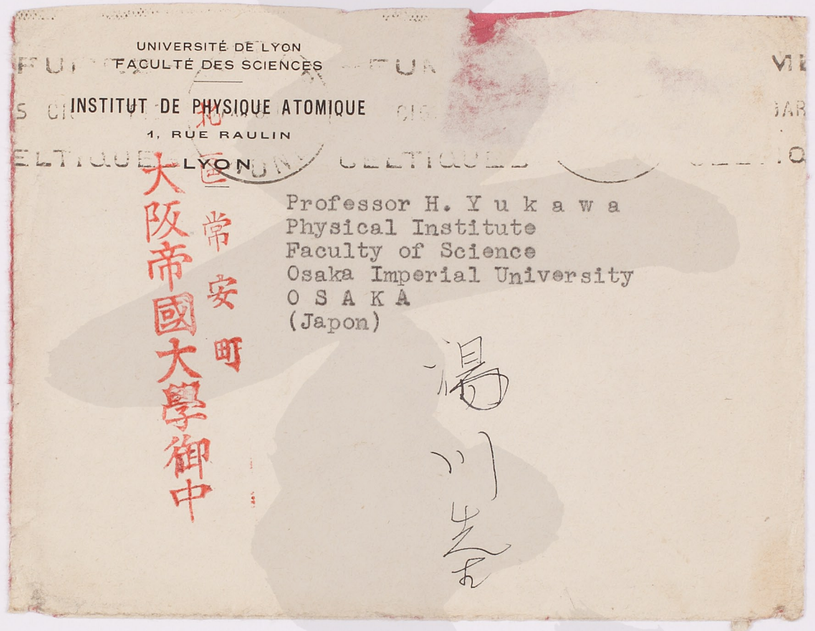

UNIVERSITÉ DE LYON
FACULTÉ DES SCIENCES

INSTITUT DE PHYSIQUE ATOMIQUE
1, RUE RAULIN
LYON

TÉL. PARMENTIER 05-45

LYON, LE 31 décembre 1938

Dear Yukawa,

I want first to thank you for your kind forwarding of your interesting reprints and to congratulate you to the important work that you have initiated.

I learned about your idea about one year ago, when I left Russia, and I got at once very enthusiastic about it. I have thought very much about the problem and I must say, that I like your idea the more, the more I think about it.

I have, however, a few objections, which do by no means affect your principal idea, but only the technical treatment of the problem. My criticism concerns mainly the treatment of the problem by Kemmer and Heitler, but also your own calculations on nuclear forces. The main point is, that I feel quite sure that any field theory leads automatically to proton neutron and proton-proton forces of the same order of magnitude and that the previous treatment - which leads only to proton-neutron forces, by a perturbation calculation - is wrong. I have tried recently to discuss in detail the limits of applicability of the perturbation method and I think that I can show now, that the second order perturbation energy is identical with the exact enery eigenvalue if we consider a uncharged field (e.g. the electromagnetic field). The perturbation method leads, however, to wrong results for a charged field (e.g. heavy electrons), because it neglects the fact, that say a proton, will always be able to emitt virtually a great number of negative heavy electrons - the charge of which is of course neutralised by a still greater number of virtually emitted positive quanta. Thus, a proton will be only 50% of the time a proton, and 50% of the time a neutron. and p-p forces will be equal p-n forces.

The second point is, that the exact theory does not lead to forces of the Heisenberg type and that I think, that the theory will have to use only one interaction constant. It seems to be very unlikely, that there should exist nonrelativistic forces between spins. I shall be glad to send you soon a reprint of a preliminary note on this subject, which is to appear in Journ. de Physique.

I shall be very happy to hear about your further work and I remain with my very best wishes

yours sincerely
Guido Beck.