

UNIVERSITY OF CAMBRIDGE
DEPARTMENT OF PHYSICS

From
PROFESSOR SIR NEVILL MOTT, F.R.S.

CAVENDISH LABORATORY
FREE SCHOOL LANE
CAMBRIDGE CB2 3RQ
Telephone 0223-54481

18th January, 1970.

Dear Professor Siegmann,

I appreciated very much our discussions about the spin polarised photoelectrons from ferromagnetic metals.

In nickel, do you think that the explanation might be as follows? The ~~spin~~ transition probability from the Fermi level to the vacuum level will in all probability be forbidden by the k-selection rule, which can of course be broken at a surface but perhaps only weakly. On the other hand, if the electron reverses its spin by creating a magnon, the k-selection rule can be satisfied and this may give a higher probability for the transition. To create a magnon would need perhaps one-twentieth of an electron volt, so this explanation suggests that, if your light has energy less than this above the work function, one would get photoelectrons with the opposite spin. Is this ruled out experimentally?

In iron, where everything is the other way round, the electron with spin parallel to the magnetisation cannot create a magnon and must make the transition by virtue of a breakdown of the selection rule at a surface. This might mean that the emission is weaker than for nickel; I wonder if this is so.

I have seen a note by Anderson on the subject; it is very tentative, outlining a number of possibilities. I hope to discuss it with him, but am posting this today as we are going to have a postal strike later this week.

During our discussions you asked whether there was any work on amorphous ferromagnons. The references are:

- A. W. Simpson, Phys. Stat. Sol. 1970, 40, 207,
W. Kobe and K. Handrich, Phys. Stat. Sol. 1970, 42, K69.

Yours sincerely,

N. F. Mott

Herrn Prof. H. C. Siegmann,
Laboratorium für Festkörperphysik,
Eidg. Technische Hochschule,
Hönggerberg,
CH-8049 Zürich,
Switzerland.

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From
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CAVENDISH LABORATORY
FREE SCHOOL LANE
CAMBRIDGE, CB2 3RQ

Telephone : 0223-54481

26th March, 1971.

Dear Dr. Siegmann,

Thank you for your letter of 15th March. I have indeed seen the paper on spin-dependent tunnelling into nickel.

I assume that Phil Anderson has sent you his note, but I think that in view of this tunnelling work what he says cannot give the answer and I confess that I am quite at a loss to explain these fascinating results. If we have any further ideas, I will certainly write to you again.

Yours sincerely,

N. F. Mott.

Dr. H. Ch. Siegmann,
Laboratorium für Festkörperphysik,
CH-8049 Zürich,
Hönggerberg,
Switzerland.