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Letter to Editor

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Spin-Mediated Electron Pairing II

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1. Background

In a recent paper [1], I showed how tandem electron pairs can be formed in a balance of forces as a brief "scattering resonance". However, it wasn't obvious what conditions were necessary for such a configuration to occur; this Letter addresses that issue.

2. How Collisions Form Tandem Electron Pairs

The electron energies of two colliding electrons must be large enough to get them close together, on the order of a few Comptons. The "classical distance of closest approach (cm)" is given in [2], as $e^2/kT = 1.44 \times 10^{-7}/T_{ev}/(2.43 \times 10^{-10})$. Note in the last equation, the distance is now measured in Comptons. Therefore the electron temperature to achieve a "minimum distance of approach of one Compton is $T_{ev} \approx 592$" and at a distance of closest approach of 10 Comptons is $T_{ev} \approx 59$. Even at those relatively short distances, the two electrons are still generally repelled by each other, hence they "fly by each other" as depicted in Figure 1(A). However, if their spins are aligned as depicted in Figure 1(B), then the so called *dipolar* force provides attraction between them and allows their *temporary binding* as depicted in Figure 1(C).

It is important to note that the number of tandem electron pairs thus-formed may be quite small but not zero because there may be some aligned electron collisions. Finally, it is useful to consider a situation in which the electron collisions take place in an external magnetic field. Such a situation could enhance the number of electrons with their spins aligned, hence producing larger numbers of tandem electron pairs.

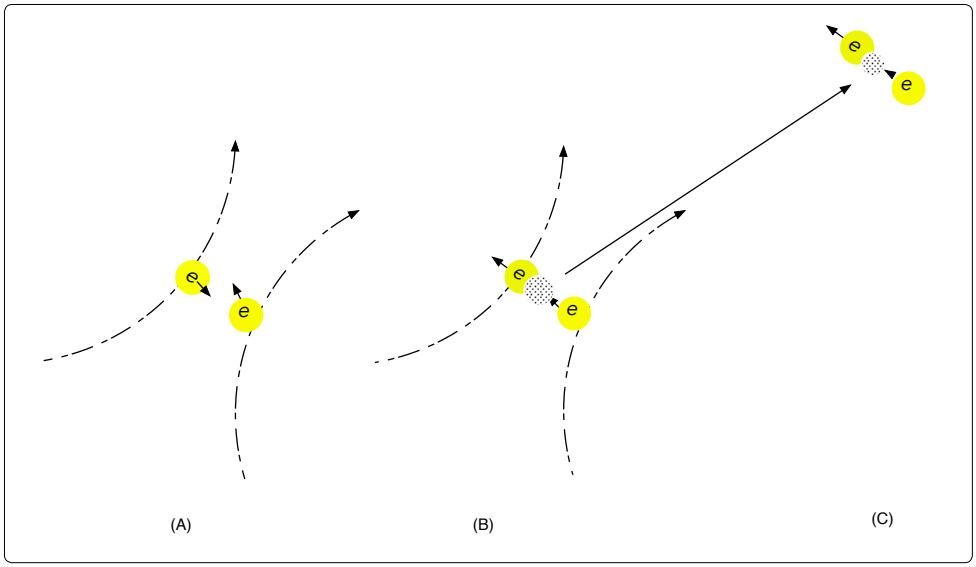

Figure 1. Two electrons colliding with unaligned-spins (A), and two electrons colliding with aligned spins (B) and the ejected tandem electron pair (C). The hazed zones between the electrons depict their magnetic dipolar interaction.

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