Hi Malcolm, 2 April 2008 spin 3.doc

A few months ago I sent you some errata on Spin Dynamics 1st Edition. These were in a document called spin 1.doc. At that time I had read through page 355 and some of the supporting appendix material.
[Paperback, Amazon, printing date April 2006]

I have since finished the book in its entirety and I list below a few more errata that I encountered. As with my previous batch, none of these is listed in your first-edition on-line errata list dated 11 Nov 2007.

I realize that you are now into the 2nd edition that is past the point of incorporating errata, so I send these to you just for whatever use you might have for them. Perhaps some of these errors exist also in the 2nd edition. If nothing else, you could add them to your first-edition errata list if you choose to maintain it.

Reading this book has been a great pleasure for me -- it was somewhat like doing a whirlwind tour of 27 foreign capitals in 3 months. I was exposed to many well-explained applications of "spin dynamics", and I wish once again to thank the planner, organizer and active guide of this very excellent tour!

Best regards,

-Phil Lucht

P.S. I have recently learned that, when you send someone a Microsoft Word (2003) document with non-standard fonts and "styles" (both of which I use in my equations), you must do two things to preserve the appearance of the document as seen by the recipient (who is likely missing some of the fonts, and who has differently defined styles such as "subscript"):

(1) in Tools/Options/Save, *check* the box which says "Embed TrueType fonts". Almost all Microsoft PC fonts nowadays are TrueType fonts.

(2) in Tools/Templates-and-Add-ins/Templates, *uncheck* the box which says "automatically update document styles".

Because I did not do these things with my previous errata document called spin 1.doc, I am resending that to you with no internal changes but with these boxes checked correctly. I am hoping this will make both these errata documents more readable to you, should the rainy day come when you want to worry about "errata". I have spared you another copy of my life history in spin 2.doc.

Chapter 13

Page 393: Last equation, -1/2 should be -1/4.

Page 397: Equation below center of page for $\rho^{\mathtt{sin}}_{\mathtt{4}}$: leading factor $I_{\mathtt{2x}}$ should be $I_{\mathtt{1x}}$.

Page 397: Bottom equation: I think the LHS should be - Re { $S_{\mathtt{states}}$} instead of +, but not sure.

Page 415: The graphic is a bit confusing because the two axes are not drawn to scale. Reader is looking for a line of slope 2 which bisects the four peaks as shown on the next page's graphic. In other words, the horizontal line at position $\Omega^0_1 + \Omega^0_2$ is drawn roughly at the height of Ω^0_2.

Page 421: Just a comment on spelling conventions. You use refocussed and labelled/labelling instead of refocused and labeled. I was always taught to double the letter only if the accent was on the penultimate syllable. In any event, the uncouth web seems to prefer refocused by a vote of 590,000 to 27,000, but labeled only wins 3:1. This may be an American/English spelling difference, and my Google may be biased due to my Utah location.

Chapter 14

Page 440: First text in section 14.5.2: The coherence ρ_{+-+} has coherence order +1, not -1. This could be fixed by replacing it with ρ_{-+-} twice in this paragraph.

Page 444: Above middle of page, equation for S(Ω): the second argument of the second Lorentzian should be $\Omega_{-\alpha\beta}$ instead of $\Omega_{-\alpha\alpha}$.

Page 459: The lower graphic on page 457 shows time markers 1,2,3...6 where 6 is the FID start. But in equation (14.7) and the following equation there are references to ρ_7. It might be clearer if both were ρ_6.

Page 461: Two different equations on this page have equation number (14.9).

Page 472: The reader might wonder what is being plotted against τ_m in the four graphs. To match the graphic on the previous page, the vertical graph axes might be labeled $-I_{1y}$, $-I_{2y}$, $-I_{3y}$ and $-I_{4y}$.

Chapter 15 -- no unlisted errata detected

Chapter 16

Page 520: The function $\mathcal{J}(\omega)$ is described as a "normalized spectral density", but the area under this function from $-\infty$ to ∞ is π, not 1. Until I noticed this fact, I was unable to correctly derive the various transition rate expressions given in this chapter. Perhaps a mention of Fermi's Golden Rule would assist the reader. This perturbation theory rule would appear in your conventions as :

$$W = 2\pi/\hbar\, |H'_{rs}|^2 \rho(E) = 2\pi/\hbar\, |\hbar\mathcal{H}'_{rs}|^2\, [\mathcal{J}(\omega)/\pi](\, d\omega/dE = 1/\hbar) = 2\, |\mathcal{H}'_{rs}|^2\, \mathcal{J}(\omega)$$

where $\mathcal{H}'_{rs} = \langle r|\, \mathcal{H}'\, |s\rangle$ and $\rho(E)dE = \rho'(\omega)d\omega = [\mathcal{J}(\omega)/\pi]d\omega$. The reader could then compute the angular averages of $|\mathcal{H}'_{rs}|^2$ and verify the unusual fractions like the 3/20 appearing in equation (16.11).

Page 524: The expression for T_1^{-1} here includes a factor $\langle B_x^2\rangle$. In discussing the temperature dependence of T_1, the reader might be thinking that the fluctuation noise-like $\langle B_x^2\rangle \propto kT_{Kelvin}$ and this might affect the temperature discussion on page 527. Eventually (page 536-7) for the d-d mechanism we

find that T_1 (for total I_z) depends on T_{Kelvin} only through the τ_c inside the $\mathcal{J}(\omega)$ evaluations and there is no explicit $<B_x^2>$ at this point. I realize this is a pretty obscure comment...

Page 541: Equation (16.28) and the two equations above it follow exactly from previously stated equations, with no approximations required about the smallness of B_I and B_S. Such approximations *are* required to justify the validity of the "fixed up" rates in (16.23). So I guess I was slightly thrown off by your page 541 comment "By using the fact that B_I and B_S are very small, we get after some manipulations". (I had an interesting battle forcing Maple to simplify terms doing this calculation.)

Page 545: Equation (16.33), in the exp {...} arguments, the second one should have Ω_1^0 instead of Ω_2^0, and the fourth one should have Ω_2^0 instead of Ω_1^0. This same error also occurs in equation (16.35). However, in (16.36) the error mysteriously has gone away so (16.36) is correct as stated. Also, the sudden reordering of terms going from (16.35) to (16.36) is a little confusing 1,2,3,4 → 1,4,3,2.

Page 555: In the fourth line of the expression for ρ_4, Ω_2^0 should be Ω_1^0 inside the cos(..) factor. This can be compared with ρ_6 on the top of page 545. The following expression for s^{cos} however is correct, although we again have a confusing reordering of terms, 1,2,3,4 → 1,4,2,3 this time.

Page 560: Expression for $K_{CH,CH}$: one wonders in this example what would be the quantities A(t) and B(t) appearing in the cross-correlation function shown in (16.43).

Page 566:

(a) Regarding the text between the two figures: the lower picture indicates that the ^1H nucleus is making a B field at the ^{15}N nucleus which is parallel to the applied (external) field, not antiparallel to it.

(b) Also, there is a double quote character at the end of this text paragraph that should not be there.

Chapter 17 (appendices)

Page 604: About middle of page in the second $R_z(-\phi)$ equation: M_u should be M_v .

Page 619: text line 9: Given the example at hand, if might be clearer to say " for every step in the cycle of block C, a complete cycle of block A is performed", just because cycle A is the inner cycle in the table.

Page 626: Bloch Equations. I guess it should be obvious to the reader that this equation is expressed in the rotating frame, not in the lab frame. I found myself wondering if the relaxation terms are really the same in both frames, after I learned about magic-angle spinning. Obviously the γ **M** x **B** lab term is very different in the rotating frame.

Page 629: Mid page: The web votes 303,000 for "Markov process" and 287 for "Markow process".

Page 630:

(a) In order for matrix X and X^{-1} to have the forms shown, we need $\Omega_\Delta \equiv \Omega^0_B - \Omega^0_A$ instead of the other way around. As presented, the columns of X are not eigenvectors of matrix L. Since all other results are quadratic in Ω_Δ, they are unaffected by this error.

(b) your errata file says one should add Ω_{av} to d_1 and d_2. The correct adder is $i\Omega_{av}$.

Page 636: First line, reference to Equation 16.6 should be to Equation 16.16 (on page 534).