Corrected Highlights of the 21 May 2009 SPIN@COSY Teleconference Meeting

ATTENDEES:
A M Kondratenko (Novosibirsk); D W Sivers (Portland); E J Stephenson (IUCF); E D Courant (NYC); A D Krisch, V S Morozov, R S Raymond (Michigan).

A.D. KRISCH: Papers, Possible November 09 Run
1. The KC Test paper was accepted by PRL on 19 May 2009.
2. We received an invitation from F. Goldenbaum for submission of a proposal to COSY with a 24jul09 deadline.
3. We are working on triple KC; so far no serious problems have emerged. However, we need more discussion, especially concerning which conditions must be satisfied.
4. The Proceedings of SPIN2008, with our 3 papers, are now at AIP and should soon be published.
5. A student, Jeff Liu, has made good progress on the Nov 08 proton data reanalysis, but is in France until 30 June.
6. We are now mostly working on the analysis for the Narrow Deuteron Resonance paper.

V.S. MOROZOV / A.M. KONDRATENKO: New KC Shape
1. Morozov e-mailed a 7-page file. Its page 1 defined the KC triple crossing parameters and listed the 7 conditions which were thought to be necessary or desirable. Kondratenko was asked if he agreed with this list; after extensive and detailed discussion, the list was modified to 3 necessary conditions for a symmetric triple KC pattern:
   a) The spin rotation angles $\Psi_{i}$ about the vertical axis (or Stable Spin Direction) must satisfy:
      i. $\Psi_{ab} = \Psi_{bc} = \Psi_{ca} = \pi m$ where m is an integer.
   b) The spin rotation angles $\theta_{i}$ about a horizontal axis must satisfy:
      i. for even m = 2n where n is an integer: $\theta_{a} = \theta_{c} = \theta_{b}/2 + \pi/4$.
      ii. for odd m = (2n + 1): $\theta_{a} = \theta_{c} = \pi/4 - \theta_{b}/2$.
   c) The tune change range $(\Delta \nu_{i})$ for each crossing (i = a, b, c) must satisfy:
      i. $\Delta \nu_{i} > 1.5 \Delta \nu_{c}^{ma} = (\nu_{i} / \nu_{c}^{ma})^{1/2}$, where $\Delta \nu_{c}^{ma}$ is the non-adiabatic tune range.

Kontratenko said that many of these details are described in his 26 Mar 09 comments.

2. Kontratenko said that many of these details are described in his 26 Mar 09 comments.
3. He added that, if m is even, all three crossings should be relatively fast. If m is odd, then the crossings can be slower, but the b crossing must have spin flip; however, after the 3 crossings, there will not be spin flip.
4. Morozov’s pages 6 and 7 were discussed; all three conditions were satisfied for both pages.

A.D. KRISCH / V.S. MOROZOV / A.W. CHAO: Narrow Deuteron Resonance Paper
1. Krisch read the abstract. Sivers said there is not enough data to support some of the conclusions, such as this narrow resonance serving as a spin flipper. He asked if Derbenev and Anferov had proposed it earlier.

[NOTE: After reading their paper, it seems that their technique may need a full Siberian snake.]

2. Sivers suggested moving the complex conjugate * to just after $\mathcal{E}$ and discussing it; Krisch said there was probably no need for detailed discussion since $\mathcal{E}$ was always real, but we can move it. Sivers said that it was not always real.
3. Krisch suggested changing some notation: $\delta r$, $A_{\nu}$, $P_{\nu}$ to $\langle P_{\nu} \rangle$, and the unbunched beam’s $\sigma_{t}$ to $\sigma_{rms}$; no one objected. He asked if we should change $t_{EFF} \equiv t_{ON} + t_{R}$ to $t_{EFF} \equiv t_{ON} + 2(\frac{\pi}{2} t_{R})$; it was decided to keep it as is. He also suggested a few small improvements to the text.

4. He noted that we are still working on fitting the data in Figs. 1 and 2 by using $\mathcal{E}$, $f_{r}$, and $\sigma_{rms}$ ($\sigma_{t}$ for Fig. 2) as fit parameters. Morozov is doing the fitting numerically, which takes a long time. When it is finished we should have values for the fit parameters with errors. He noted that $\chi^{2}/N$ in Fig. 1 should instead be $\chi^{2}/(N-3)$.
5. Krisch suggested a sentence referring to earlier papers by Derbenev, Kondratenko and Skrinsky, in which narrowing of a spin resonance due to bunching was discussed for electrons. Kondratenko agreed with the proposed sentence and promised to send two appropriate references.
6. Sivers said that if $\mathcal{E}$ in Eqs. (4) and (5) had an imaginary part, then the equations would have exponentially growing or decaying terms, which would change our results. He also said we would need more data points in Figs. 3 and 4 to support some of our conclusions. Krisch asked Morozov to send Sivers Refs. [32] and [33] with some relevant data from IUCF.

[NOTE: On 22 May, after receiving Chao’s e-mail with detailed suggested changes to the paper, Krisch discussed with Chao, Sivers’ above concerns about $\mathcal{E}$. After much discussion, it seems that $\mathcal{E}$ may always be real for an rf resonance since its strength ($\mathcal{E}$) does not depend upon the properties of particles in the beam. However, the $\mathcal{E}$ of an intrinsic resonance certainly does depend on the particles’ betatron tunes; hence, $\mathcal{E}$ may have a measurable phase. Thus, as Sivers suggested, we will add a sentence saying that we ignore the imaginary part of $\mathcal{E}$.]

V.S. MOROZOV: 2008 Data Reanalysis
1. Delayed due to lack of time.

ROUNDTABLE:
1. The next SPIN@COSY Teleconference was tentatively scheduled for Thursday, 18 June 2009 at 11:00 EDT.