A.D. KRISCH: Papers and PAC
1. Our Chao test PRL was more or less accepted. The referee made many very good suggestions: rearranging the text and adding two new figures. He sent to SPIN@COSY the 10dec07-draft-PRL, with updated Figs. 3, 4, & 5 and some suggestions by Wong. [NOTE: it was resubmitted at 20:11 on 13dec07 and accepted at 10:01 on 14dec07.]
2. There has not been much progress on the deuteron solenoid strength paper.
3. We will probably submit an article to CERN Courier based on the Chao test PRL.
4. The PAC meeting went well. Lehrach, with Maier’s help, made a special closed session presentation; it apparently made a good impression on the PAC. SPIN@COSY is approved for 2 runs: one in May 2008 just before the PAC meeting; and one in 2008-2. Maier said he sent Barber the translation of Kondratenko’s resonance strength paper.

R. MAIER: COSY 2008 Schedule.
1. He said that the schedule distributed by Büscher was almost firm; it will be officially finalized next week and probably nothing will change. Chao and Sivers asked Krisch to inform everyone when they can start making travel plans. Krisch promised to forward to everyone the final schedule, when it is ready. [NOTE: It is now firm]
2. Krisch said SPIN@COSY does not need to submit a proposal update in May 2008; but we should submit a one-page beam time request. He plans to attend the 26-27 May 2008 PAC meeting to discuss the request.

R. MAIER: Increasing COSY’s Proton Polarization
1. Krisch said SPIN@COSY hopes to help COSY with its low proton polarization problem, as we helped the AGS in 2002. Often just discussing a problem with an outside group helps to solve it.
2. Maier said the measured polarization was 80% in the low energy polarimeter after the cyclotron. In Oct06 & Mar07 protons were accelerated to 1.3 GeV/c crossing the Gy = 2 and Gy = 3 imperfection resonances and a weak intrinsic resonance between them; the polarization measured by EDDA was only 40%. In Nov07 ANKE measured the polarization at injection; it was again only 40%. Thus, the polarization loss was not during acceleration in COSY.
3. The loss apparently started after WASA was installed during summer 2006. No large magnets were installed or moved; however, two correcting steerers were removed; their coils were moved to the quadrupoles near WASA. WASA’s superconducting solenoid was off during the measurements.
4. Krisch suggested making a detailed field map of the WASA solenoid with its current turned off. Maier replied that this would involve removing some hardware; they plan to do this during a 2008 shutdown. The beam pipe size is reduced to 90 mm inside the WASA solenoid; they could map its field within that area with a 15 mm Hall probe.
5. Krisch said a longitudinal magnetic field is a possible suspect. Maier said the observed polarization loss would require ~0.2 Tm; it seems unlikely that WASA’s solenoid could cause such a large field when it is switched off. [NOTE by ADK: Morozov recently calculated that a 50% loss would need 0.25 and 0.34 T at 294 & 1300 MeV/c, respectively. Maier then said he hoped he said 0.2 not 2 Tm. I apologize for my contribution to this confusion.]
6. Krisch then suggested measuring the radial polarization component to check if the stable spin direction is rotated; if they find a large radial component this would suggest a significant longitudinal field somewhere. Maier said ANKE cannot measure the radial polarization; Krisch suggested measuring it with EDDA; Maier agreed that EDDA could measure the radial polarization at 1.3 GeV/c.
7. Lehrach said that they plan to turn-on the electron cooler solenoids to test if that changes the polarization.
8. Stephenson noted that the electron cooler is another place where large longitudinal fields are present. Maier replied that the electron cooler solenoids are connected in series to compensate the fields. Krisch noted that some cooler magnets could have failed. He suggested testing the fields near the magnets with a small Hall probe. Maier replied that they used a magnetic compass and a small Hall probe to test the fields around the ring but found nothing.
9. Krisch suggested doing this test again both in the ring, and in the injection line and injection point. Maier replied no work was done in the injection line. Krisch said something might have failed there and urged testing it.
10. In response to a question, Maier said that high proton polarization was last measured (by SPIN@COSY) in December 2005. Krisch suggested looking for something that might have happened since then.
11. In response to another question, Maier said that there is a 20 cm difference in elevation between the cyclotron and COSY, which did not cause a problem in the past. The source’s Wien Filter rotates the polarization so that it is vertical after the cyclotron, where it is measured by the Low Energy Polarimeter to indeed be vertical and ~80%.
12. Krisch asked how they compensate the vertical bend. Lehrach replied that they do not compensate it because there is no horizontal bend between where the beam is twice bent vertically. Krisch said that there would be a problem if the polarization had a horizontal component before the two vertical bends. Lehrach disagreed, saying that two rotations back and forth by the same angle around the same axis can not produce any net effect; Krisch disagreed.
13. Maier thanked everyone and asked people to let him know if anyone comes up with any more ideas.

M.A. LEONOVA: Revised PRL
1. She said we got a positive reply from the referee who liked the quality of the data, but suggested a major rearrangement of how the data were presented. We made most of the suggested changes. Leonova read the description of the most important changes described in our Response to the Referee.
2. Krisch noted that the Referee’s most important point is that we did not clearly explain how the data in Figs. 3 and 4 were analyzed. He said he did not understand what polarimeter data figure the referee wanted us to include; no one had any suggestions.

3. Sivers suggested adding a few sentences stressing the sensitivity of the Chao test data in Fig. 5 to the resonance strength $\varepsilon$; Krisch agreed. Stephenson said Fig. 5's sensitivity to $\varepsilon$ seems similar to that in Eq. (2) and Fig. 2; thus, there is nothing special about Fig. 5. Sivers agreed but noted that Fig. 5 gives a better picture; he added that Chao’s formalism provides a powerful tool to study spin resonances. Krisch said he was not sure if Fig. 2 was as sensitive to $\varepsilon$ as Fig. 5. He asked Leonova to send e-mail graphs of all 13 $\Delta t$ curves, which were used to find $\varepsilon$.

4. Chao noted that the oscillations’ amplitudes in Fig. 5 are sensitive to the value of $\delta f_{2p}$. Krisch agreed. Sivers and Stephenson discussed that the peak-to-peak size of the oscillations is sensitive to $\delta f_{2p}$ while the depth of the first oscillation is determined by a combination of the sensitivities to $\varepsilon$ and $\delta f_{2p}$.

5. Krisch asked if we should reduce the error on $\delta f_{2p}$. Stephenson asked if the $\chi^2/(N-2)$ values shown in Figs. 3 and 4 were taken into account; Morozov replied no. Krisch noted that the later analysis using $\chi^2$ plots may effectively take them into account. He asked Morozov to indicate the $\chi^2/(N-1)$ values in the tables below the $\chi^2$ plots and then resend the updated file. [NOTE: Morozov e-mailed the updated file.] After some discussion, it was decided to use a 1 Hz error for $\delta f_{2p}$ rather than 2 or 0.7-0.9 Hz.

6. Maier noted that the $\chi^2$ analysis gives somewhat different values of $f_c$ for the different polarization states; Krisch replied that the $f_c$ spread is consistent with the quoted error. Chao asked if any weights were used to emphasize different aspects of the data. Morozov replied no; only the measurement errors were used.

7. Sivers promised to send a few sentences emphasizing the sensitivities to $f_c$, $\delta f_{2p}$ and $\varepsilon$. Krisch said he would send a final draft of the paper before resubmitting it to PRL. [NOTE: Sivers and Krisch both sent the promised items.]

V.S. MOROZOV/ M.A. LEONOVA: Early Data Reanalysis

1. Morozov said is something wrong with our analysis of the February 03 deuteron data. The data might have been recorded in a different way in February 03 than in the later runs. Krisch asked Maier to encourage Ulbrich to look into this. Morozov said he found some of EDDA’s documentation but, so far, he could not find anything about the data recording structure.

V.S. MOROZOV/ A.M. KONDRAFENKO: Kondratenko Resonance Strength Paper

1. Morozov read the abstract of Kondratenko’s deuteron $\varepsilon$ paper. It tries to explain the deuteron $\varepsilon$ value measured at COSY. Its chapter 1 discusses the experimental technique for measuring $\varepsilon$.

2. Chapter 2 gives a general $\varepsilon$ formula, Eq. (3.1); Eqs. (3.1) and (3.14) give $\varepsilon$ in the cases $G_f \gg 1$ and $G_f << 1$, respectively. Equation (3.15) is a combination of Eqs. (3.11) and (3.14) that is valid in both cases; the error is significant when $G_f \sim 1$. If all longitudinal fields are fully compensated, then $\varepsilon \rightarrow 0$ when $G \rightarrow 0$.

3. Chapter 3 discusses the direct effect of a radial-field rf dipole. It concludes that the rf dipole’s direct effect cannot be considered separately from the effect of the ring’s quadrupoles. Its Eq. (3.7) gives the rf dipole induced $\varepsilon$ in a “smooth-focusing” circular accelerator.

4. Chapter 4 discusses calculation of $\varepsilon$ using Kondratenko’s response function. The response function for a smooth focusing circular accelerator is given by Eq. (4.12). The response function for COSY is shown in Fig. 3. Its value at the rf dipole’s location is about 0.09, which corresponds to $\varepsilon$ of ~50°. The difference from the measured value may be due to the approximation used in the calculations. The response function for a hypothetical particle with $G = 0$ is shown in Fig. 4. The non-zero value of the response function is due to the ring’s longitudinal fields. The response function can be used to calculate the total strength of several rf dipoles; their phases must be included.

5. Chapter 5 discusses the strength of an rf-dipole-induced resonance near an intrinsic resonance. It is approximately given by Eq. (5.4); but Eq. (5.4) is only valid very near the intrinsic resonance. Figure 6 compares the measured $\varepsilon$ vs $v$, data with the calculations using the approximate Eq. (5.4) and the more accurate Eq. (5.11). The deviation of the curves from the data may be due to the approximations used in the calculation.

6. After some discussion with Krisch, Courant and Chao, Kondratenko tentatively agreed to replace his terms “structural” and “non-structural” intrinsic resonances with “superperiodic” and “non-superperiodic” intrinsic resonances, respectively. Krisch suggested making Fig. 6 semilog and adding the curves’ definitions to its caption. Kondratenko agreed to try. [NOTE: He instead used periodical and non-periodical.]

7. Sivers asked if Kondratenko had any comments about Mane’s PRST-AB. Kondratenko responded that he sent his comments to Mane and received some replies from him. Krisch asked Kondratenko to forward to him Kondratenko’s correspondence with Mane. Kondratenko agreed. [NOTE: Kondratenko sent them.]

ROUNDTABLE:

1. The next SPIN@COSY Teleconference was scheduled for Thursday, 7 February 2008 at 16:30 German time or 10:30 Michigan time.

2. Maier asked about nominating invited speakers for SPIN 2008. Krisch suggested contacting Rathmann, who is a member of the International Committee. He said Crabb suggested also having invited talks in the parallel sessions.

3. Luccio commented that he must issue a big disclaimer when comparing the factors $G_f v_s (1+G_f)$ in his simulations of the $\varepsilon$ equation for rf dipoles. Although his numerical simulations for $G_f v_s$ agree with the data, one must be careful about the underlying theory; Krisch thanked him for this sensible comment.