A COMMENT ON A COMMENT ON A COMPARISON:

A REPLY TO LOVELACE AND DONNACHIE[*]

A. D. Brody, D. W. G. S. Leith, B. G. Levi, and B. C. Shen

Stanford Linear Accelerator Center
Stanford University, Stanford, California 94305

D. Herndon, R. Longacre, L. Price, A. H. Rosenfeld, and P. Soding[/]

Lawrence Radiation Laboratory
University of California, Berkeley, California 94720

After some months of unsuccessfully trying to reach agreement with Lovelace and Donnachie on the question of $\pi^- p$ phase shift analysis, we feel it necessary to further explain our first letter.[1]

In that paper we said, "It is clearly evident that though the CERN-EXP solution describes the data well, there are marked discrepancies between the CERN-TH predictions and the experimental data." In their Comment,[2] Lovelace and Donnachie say that it is redundant for us to point out this discrepancy because it is clearly visible in the graphs in their papers.

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We can only reply that these graphs, together with the associated text, had left us, and others, with the impression that though some of the CERN-TH fits were a bit too smooth starting at the T_π = 900 MeV bump, they were otherwise quite satisfactory. This impression was heightened by the fact that the Argand plots appearing in the Heidelberg[3] and Vienna Conference[4] proceedings included only the TH fits. Considerable importance, of course, is attached to these plots since, as the authors themselves say, the resonance parameters are in turn determined from these Argand diagrams, and unfortunately many subsequent calculations and reviews have used the CERN-TH amplitudes.

Let us compare the elastic cross section measurements $\sigma_{el}(\pi^-p)$ with those calculated from the CERN-TH fit, $\sigma(TH)$, at the peak of the "600 MeV bump" where S_{11}, P_{11}, and D_{13} are all near resonance. The several experiments plotted in our Figure 1 showed σ_{el} = (20 $\pm$ 0.5) mb, and $\sigma(EXP)$ agree, but $\sigma(TH)$ is only 17 mb -- not very good agreement at all. Yet, if one looks at the CERN plots of η and δ near T_π = 600 MeV, one finds what we had always considered good agreement between the EXP solutions and the TH fits.

This surprising sensitivity of the measurable variable, $\sigma(\pi^-p)$, on the phase shift parameters, η and δ, was one of the main points in our letter.

Finally, we apologize for the confusion caused by our use of the identity CERN-TH $\equiv$ CERN-I, in our letter. The name CERN-I was introduced by Donnachie in his Vienna rapporteur's report[4], and covers everything described in their article in Physics Letters 26B, 164 (1968), (i.e., CERN-EXP and CERN-TH). However, in the Vienna text, Donnachie unfortunately

mainly refers to the CERN-TH Argand plots and the associated resonance parameters. We wish to emphasize again, that our comparison underlined the success of the CERN-EXP solutions, and wished only to point out the surprising discrepancy between the CERN-TH fit and the data.

References

1. A. D. Brody, D. W. G. S. Leith, B. G. Levi, and B. C. Shen, Stanford Linear Accelerator Center, Stanford University, and D. Herndon, R. Longacre, L. Price, A. H. Rosenfeld, and P. Soding, Lawrence Radiation Laboratory, University of California, Berkeley, California, Phys. Rev. Letters $\underline{22}$, 1401 (1969).

2. C. Lovelace and A. Donnachie, CERN Report CERN-TH-1055, submitted to Physical Review Comments (1969).

3. C. Lovelace, Proceedings of the International Conference on Elementary Particles, Heidelberg, Germany, 1967.

4. A. Donnachie, Proceedings of the Fourteenth International Conference on High Energy Physics, Vienna, Austria, September, 1968.