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Authors
Hall, B.H.
Bland, R.W.
Goldhaber, G.
et al.

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B. H. Hall, R. W. Bland,* G. Goldhaber, and G. H. Trilling

Department of Physics and Lawrence Radiation Laboratory
University of California, Berkeley, California 94720

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In this note we report revised results of a partial wave analysis of K^+p elastic scattering at 860, 970, and 1210 MeV/c,[1] based on new polarization data[2] as well as the previously used differential cross section data.[3] We have also included the partial inelastic cross sections as determined by Bland et al. from an analysis of the $K\Delta$ final state at the two lower momenta.[4] The values of these cross sections for the K^+p initial state are shown in Table I. At 1210 MeV/c we were unable to use this analysis due to the additional presence of the K^*N final state and here we have used only the total inelastic cross section. The real parts of the forward scattering amplitude as calculated by Carter[5] were also used; this effectively fixes the s wave to be negative, as determined at lower momenta.[6]

The solutions we have obtained at 865 and 970 MeV/c are shown in Table I. Inclusion of the new polarization data eliminated our previous B^- type solution and slightly decreased the errors on the phase shifts of the remaining solution (A^- type). We feel that this solution is the only one consistent with both the elastic data and the partial wave makeup of the inelastic cross section as determined by Bland et al.

In Table II we show solutions obtained at 1207 MeV/c. The solutions fall into two classes, the fits equally good for each: the A^- type, continuous with the lower momenta, and the C^- type, distinguished by a negative $P_{3/2}$ wave.

Presently existing data, when fit with a Legendre series, do not seem to require the inclusion of f waves. However, SPDF solutions give partial wave inelasticities in better agreement with the results of the KΔ final state analysis of Bland et al., i.e., a fairly inelastic $P_{3/2}$ wave and an almost elastic $S_{1/2}$ wave. For this reason we show both our SPD and SPDF solutions. Figure 1 shows an Argand plot of the solutions at 865 and 970 MeV/c and of our preferred solution at 1210 MeV/c, the A^- SPDF solution.

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FIGURE CAPTIONS

Fig. 1. Argand diagram for K^+p partial wave amplitudes at 865, 970 and 1210 MeV/c.

Fig. 2a,b,c. Differential cross sections and polarization data. The curves correspond to the best fits.

Table I. Phase shift solutions at 865 and 970 MeV/c.

		865 MeV/c	970 MeV/c	Partial inelastic cross sections, input values from Ref. 4 in millibarns	
				865 MeV/c	970 MeV/c
$S_{1/2}$	δ	-38.8±2.4	-40.5±2.6	--	--
	η	$0.987^{+0.013}_{-0.015}$	$0.996^{+0.004}_{-0.045}$		
$P_{1/2}$	δ	-13.5±2.7	-15.3±3.5	0.96±0.11	1.7±0.2
	η	0.915±0.014	0.833±0.026		
$P_{3/2}$	δ	11.9±1.4	15.3±1.4	0.57±0.07	1.5±0.15
	η	0.974±0.006	0.903±0.015		
$D_{3/2}$	δ	-3.7±0.5	-3.9±0.7	0.05±0.01	0.21±0.06
	η	0.998±0.001	0.988±0.005		
$D_{5/2}$	δ	-2.1±0.8	-1.2±1.1	0.05±0.01	0.23±0.07
	η	0.9985±0.0004	0.992±0.003		
Re(kf) in cm		-0.54	-0.44		
$\sigma_{inelastic}$ (mb)		1.72	3.65		
σ_{total} (mb)		13.64	15.36		
χ^2		38.5	38.7		
Degrees of freedom		38	36		
Probability		0.45	0.35		

Table II. Phase shift solutions at 1210 MeV/c.

Solution type		A^-	A^-	C^-	A^-	C^-
$S_{1/2}$	δ	-72.5±6.2	-59.9±7.9	-29.7±0.8	-54.0±16.2	-32.4±4.0
	η	0.68±0.07	0.67±0.22	0.90±0.04	$0.92^{+0.08}_{-0.54}$	0.84±0.15
$P_{1/2}$	δ	-13.1±2.7	-28.4±6.4	-2.0±0.9	-17.7±6.8	-9.1±3.3
	η	$1.0^{+0.0}_{-0.03}$	0.90±0.08	$1.0^{+0.0}_{-0.62}$	$0.95^{+0.05}_{-0.37}$	$0.98^{+0.02}_{-0.14}$
$P_{3/2}$	δ	2.5±2.7	2.8±3.8	-28.6±0.9	4.2±8.4	-28.1±8.8
	η	0.70±0.05	$0.94^{+0.06}_{-0.12}$	0.82±0.04	0.78±0.16	0.64±0.04
$D_{3/2}$	δ	-8.9±1.2	-7.0±2.6	-4.2±0.6	-10.0±2.7	-7.8±2.1
	η	$1.0^{+0.0}_{-0.03}$	$0.98^{+0.02}_{-0.06}$	$1.0^{+0.0}_{-0.06}$	$1.0^{+0.0}_{-0.10}$	0.92±0.02
$D_{5/2}$	δ	-1.8±1.1	1.6±2.0	13.7±0.5	0.6±3.1	12.7±2.7
	η	0.89±0.02	0.79±0.02	0.74±0.04	$0.94^{+0.06}_{-0.18}$	$1.0^{+0.0}_{-0.12}$
$F_{5/2}$	δ				0.7±2.9	-1.3±0.6
	η				$0.95^{+0.05}_{-0.19}$	0.94±0.03
$F_{7/2}$	δ				2.3±1.1	0.1±2.4
	η				0.93±0.04	$1.0^{+0.0}_{-0.51}$
Re(kf) in cm		-0.73	-0.75	-0.75	-0.73	-0.72
$\sigma_{inelastic}$ (mb)		7.45	7.42	7.42	7.42	7.41
σ_{total} (mb)		18.32	18.32	18.32	18.32	18.32
χ^2		33.7	29.5	29.4	24.4	25.3
Degrees of freedom		32	32	32	28	28
Probability		0.39	0.60	0.61	0.66	0.61

1

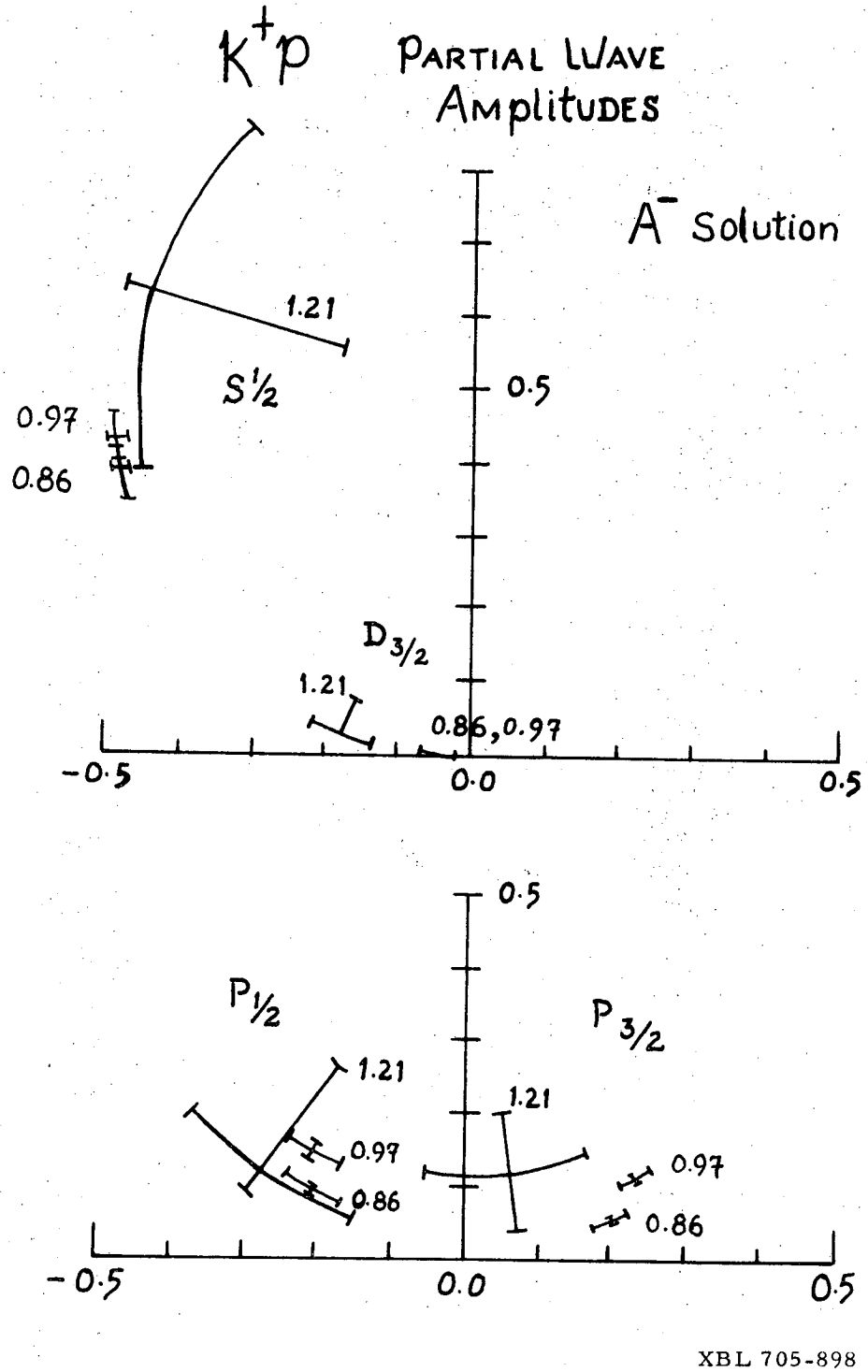

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Fig. 1

2a

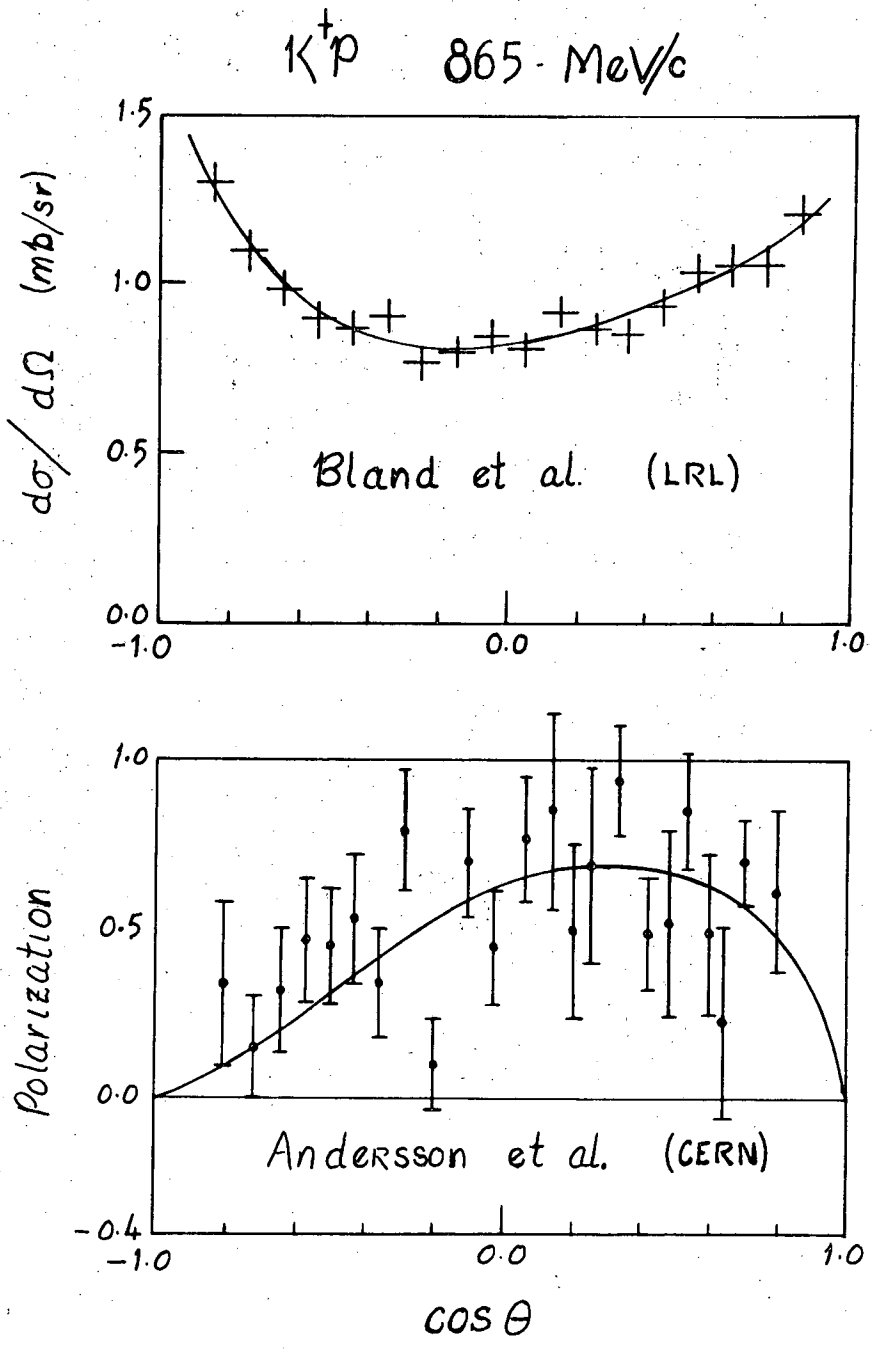

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Fig. 2a

2b

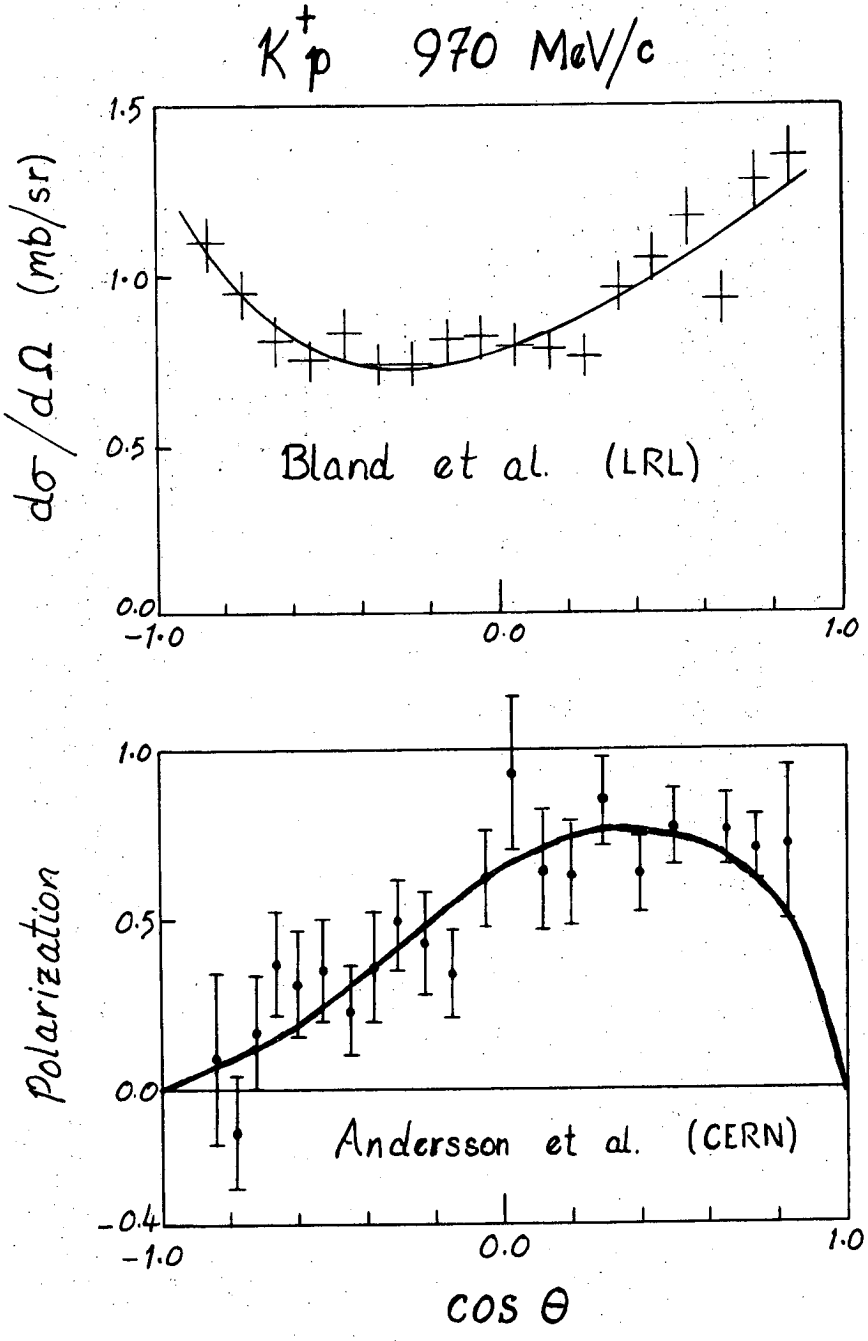

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Fig. 2b

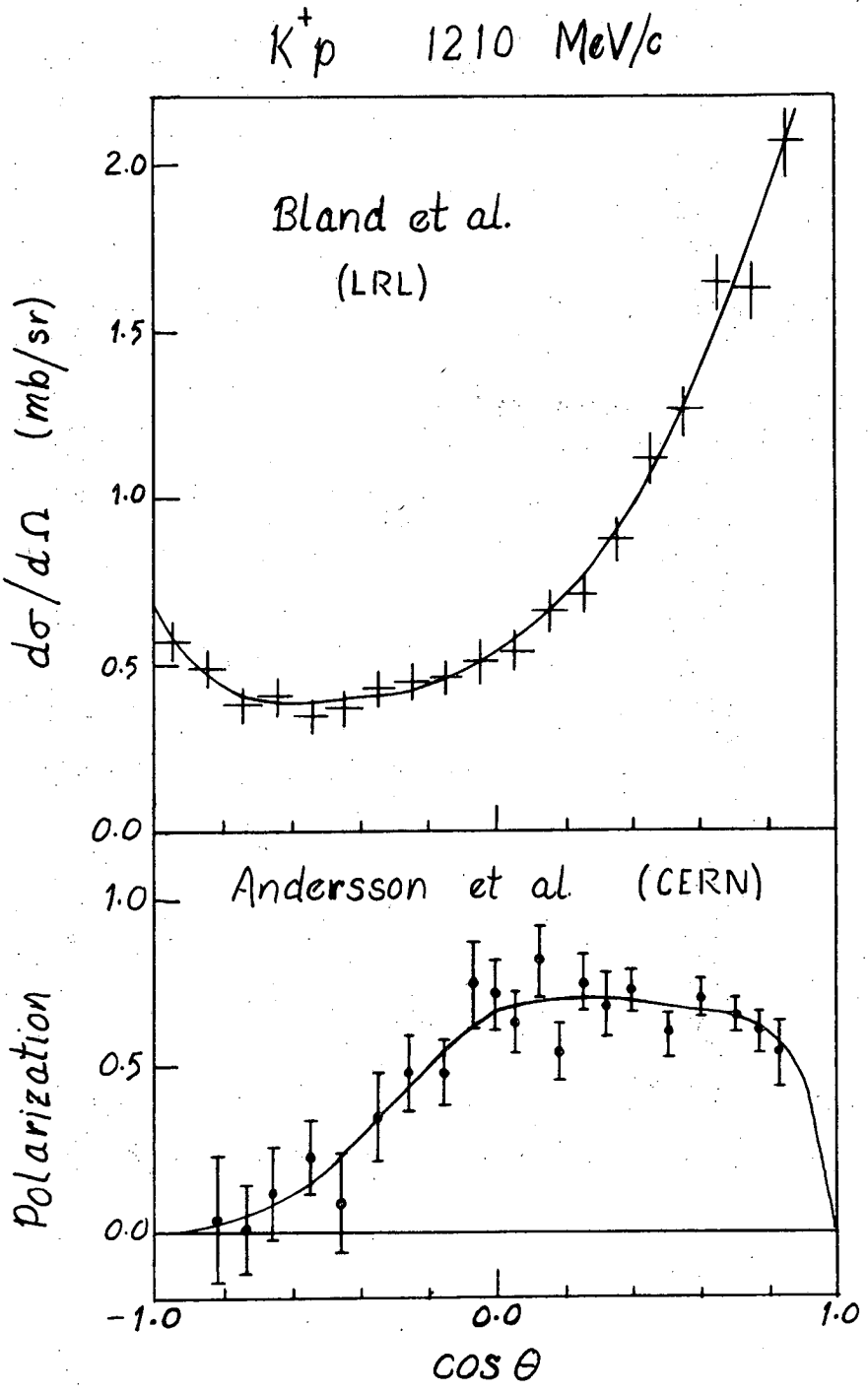

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Fig. 2c

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LAWRENCE RADIATION LABORATORY
UNIVERSITY OF CALIFORNIA
BERKELEY, CALIFORNIA 94720