$\rho(770)$

$I^G(J^{PC}) = 1^+(1^{--})$

Our latest mini-review on this particle can be found in the 1984 edition.

NOTE ON THE $\rho(770)$

Because of the large width of the $\rho(770)$, determination of the resonance parameters is beset with many difficulties. It is well known that in physical-region fits the line shape does not correspond to a relativistic Breit-Wigner function with a P-wave width, but requires some additional shape parameter. This dependence on parametrization was demonstrated long ago by PISUT 68, who showed that the mass was consistent with values between 761 MeV and 783 MeV to within two standard deviations. When mass values are quoted, as below, with one-standard-deviation errors, the conflicts between them are evident.

The same model dependence afflicts any other source of the resonance parameters, such as the energy dependence of the phase shift δ_1^1 or the pole position. It is therefore not surprising that a recent study of the $\rho(770)$ dominance in the decays of η and η' reveals the need for specific dynamical effects in addition to the $\rho(770)$ pole (BENAYOUN 93).

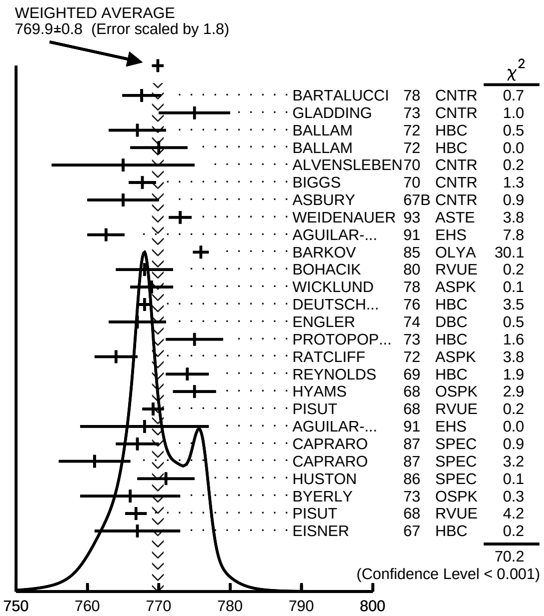
Recently LAFFERTY 93 has demonstrated that Bose-Einstein correlations is another source of shifts in the $\rho(770)$ line shape.

$\rho(770)$ MASS

We no longer list S-wave Breit-Wigner fits, or data with high combinatorial background.

MIXED CHARGES

VALUE (MeV)	*DOCUMENT ID*
769.9±0.8 OUR AVERAGE	Includes data from the 3 datablocks that follow this one. Error includes scale factor of 1.8. See the ideogram below.



$\rho(770)$ MASS MIXED CHARGES

CHARGED ONLY

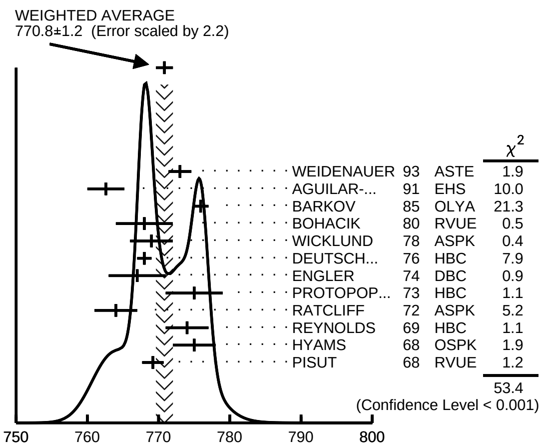
VALUE (MeV)	*EVTS*	*DOCUMENT ID*	*TECN*	*CHG*	*COMMENT*
The data in this block is included in the average printed for a previous datablock.					
766.9±1.2 OUR AVERAGE					
768 ±9		AGUILAR-... 91	EHS		400pp
767 ±3	2935	[1] CAPRARO 87	SPEC	−	200 $\pi^- \text{Cu} \rightarrow \pi^-\pi^0 \text{Cu}$
761 ±5	967	[1] CAPRARO 87	SPEC	−	200 $\pi^- \text{Pb} \rightarrow \pi^-\pi^0 \text{Pb}$
771 ±4		HUSTON 86	SPEC	+	202 $\pi^+ A \rightarrow \pi^+\pi^0 A$
766 ±7	6500	[2] BYERLY 73	OSPK	−	5 $\pi^- p$
766.8±1.5	9650	[3] PISUT 68	RVUE	−	1.7–3.2 $\pi^- p$, t <10
767 ±6	900	[1] EISNER 67	HBC	−	4.2 $\pi^- p$, t <10

NEUTRAL ONLY, PHOTOPRODUCED

VALUE (MeV)	*EVTS*	*DOCUMENT ID*	*TECN*	*CHG*	*COMMENT*
The data in this block is included in the average printed for a previous datablock.					
768.1± 1.3 OUR AVERAGE					
767.6± 2.7		BARTALUCCI 78	CNTR	0	$\gamma p \rightarrow e^+e^- p$
775 ± 5		GLADDING 73	CNTR	0	2.9–4.7 γp
767.0± 4.0	1930	BALLAM 72	HBC	0	2.8 γp
770.0± 4.0	2430	BALLAM 72	HBC	0	4.7 γp
765.0±10.0		ALVENSLEBEN 70	CNTR	0	γA, t <0.01
767.7± 1.9	140k	BIGGS 70	CNTR	0	<4.1 $\gamma \text{C} \rightarrow \pi^+\pi^- \text{C}$
765 ± 5.0	4000	ASBURY 67B	CNTR	0	γ + Pb

NEUTRAL ONLY, OTHER REACTIONS

VALUE (MeV)	*EVTS*	*DOCUMENT ID*	*TECN*	*CHG*	*COMMENT*
The data in this block is included in the average printed for a previous datablock.					
770.8±1.2 OUR AVERAGE Error includes scale factor of 2.2. See the ideogram below.					
773 ±1.6		WEIDENAUER 93	ASTE		$\bar{p}p \rightarrow \pi^+\pi^-\omega$
762.6±2.6		AGUILAR-... 91	EHS		400pp
775.9±1.1		[4] BARKOV 85	OLYA	0	$e^+e^- \rightarrow \pi^+\pi^-$
768.0±4.0		[5,6] BOHACIK 80	RVUE	0	
769.0±3.0		[2] WICKLUND 78	ASPK	0	3,4,6 $\pi^\pm N$
768.0±1.0	76000	DEUTSCH... 76	HBC	0	16 $\pi^+ p$
767 ±4	4100	ENGLER 74	DBC	0	6 $\pi^+ n \rightarrow \pi^+\pi^- p$
775.0±4.0	32000	[5] PROTOPOP... 73	HBC	0	7.1 $\pi^+ p$, t <0.4
764.0±3.0	6800	RATCLIFF 72	ASPK	0	15 $\pi^- p$, t <0.3
774.0±3.0	1700	REYNOLDS 69	HBC	0	2.26 $\pi^- p$
775.0±3.0	2250	HYAMS 68	OSPK	0	11.2 $\pi^- p$
769.2±1.5	13300	[7] PISUT 68	RVUE	0	1.7–3.2 $\pi^- p$, t <10
• • • We do not use the following data for averages, fits, limits, etc. • • •					
768 ±1		[8] GESHKENBEIN 89	RVUE		π form factor
777.4±2.0		[9] CHABAUD 83	ASPK	0	17 $\pi^- p$ polarized
770 ±2		[10] HEYN 81	RVUE		Pion form factor
769.5±0.7		[5,6] LANG 79	RVUE	0	
770 ±9		[6] ESTABROOKS 74	RVUE	0	17 $\pi^- p \rightarrow \pi^+\pi^- n$
773.5±1.7	11200	[1] JACOBS 72	HBC	0	2.8 $\pi^- p$



$\rho(770)^0$ mass (MeV)

[1] Mass errors enlarged by us to $\Gamma/\sqrt{N}$; see the note with the $K^*(892)$ mass.
[2] Phase shift analysis. Systematic errors added corresponding to spread of different fits.
[3] From fit of 3-parameter relativistic P-wave Breit-Wigner to total mass distribution. Includes BATON 68, MILLER 67B, ALFF-STEINBERGER 66, HAGOPIAN 66, HAGOPIAN 66B, JACOBS 66B, JAMES 66, WEST 66, BLIEDEN 65 and CARMONY 64.
[4] From the Gounaris-Sakurai parametrization of the pion form factor.
[5] From pole extrapolation.
[6] From phase shift analysis of GRAYER 74 data.