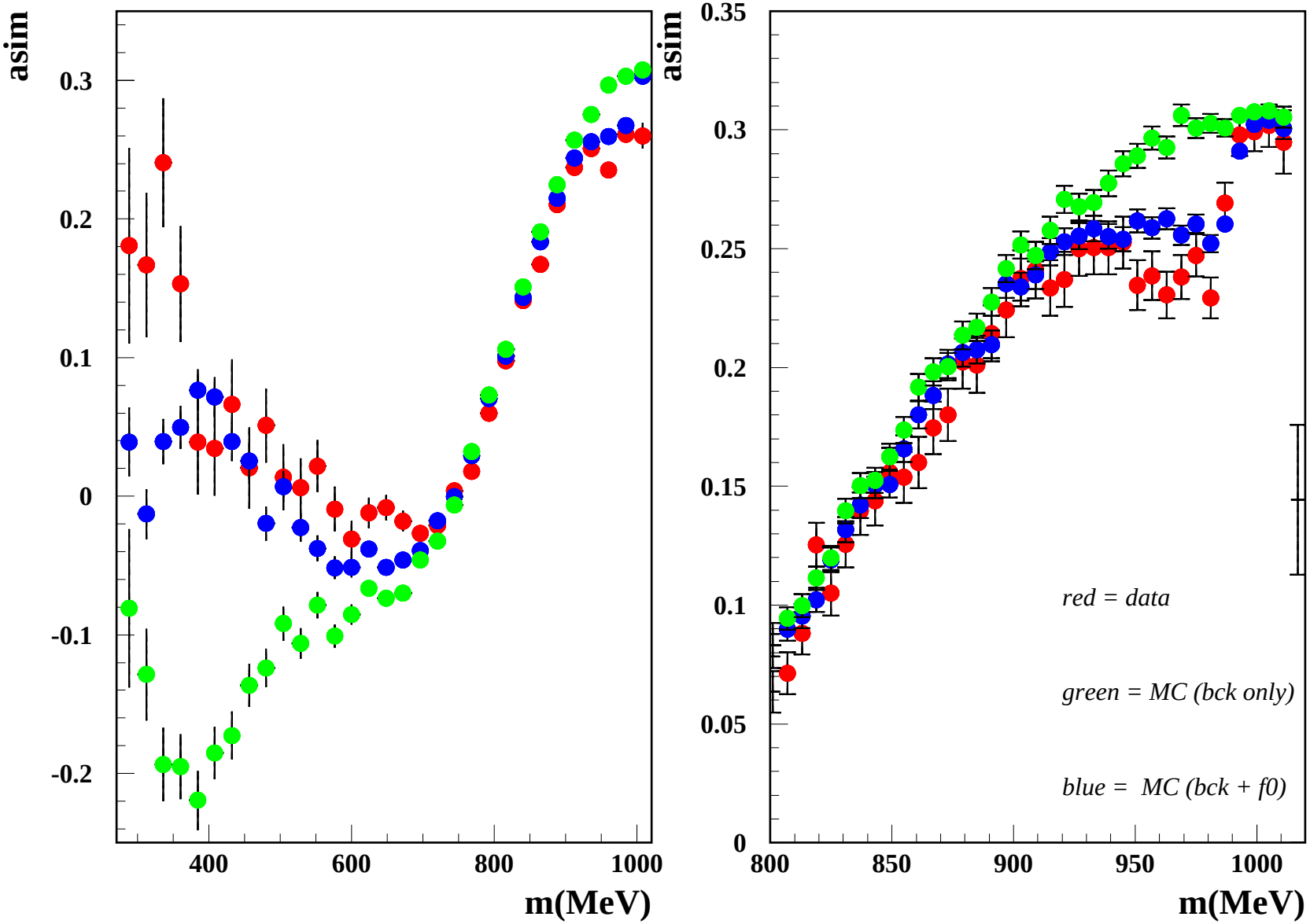
LNF 09/05/05

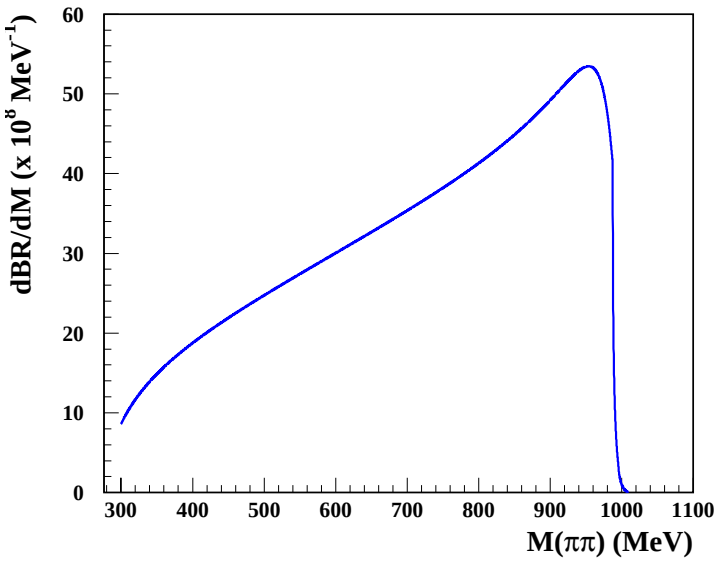
(1)Interpretation of the charge asimmetry profile
(2)Upgrade of the “No Structure” parametrization

New EVA: ISR + FSR + f_0(KL with parameters from $\pi^+\pi^-$ fit)

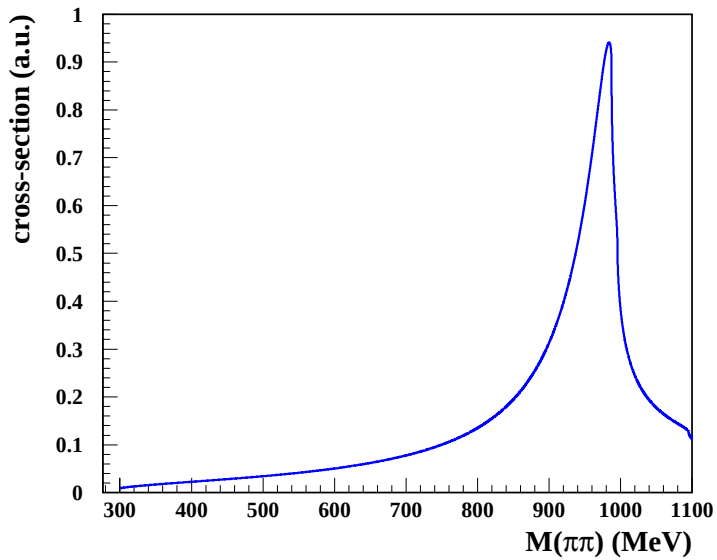


Why is the f_0 so “effective” far from its mass ?

f_0 amplitude according to KL fit



f_0 cross-section peak “after” cancellation of interference



Upgrade of the “No Structure” parametrization

$$A_1 = \frac{esm_\varphi^2}{4 f_\varphi} \frac{1}{D_\varphi(s)} \left[\frac{g_{\varphi f\gamma} g_{f\pi+\pi-}}{D_f(m)} + \left(\frac{a_0}{m_\varphi^2} e^{ib_0\sqrt{m^2-4m_\pi^2}} + a_1 \frac{m^2 - m_f^2}{m_\varphi^4} e^{ib_1\sqrt{m^2-4m_\pi^2}} \right) \right]$$

$$D_f(m) = m^2 - m_f^2 + i m_f \left(g_{\pi\pi}\sqrt{m^2/4 - m_\pi^2} + g_{KK}\sqrt{m^2/4 - m_{K^\pm}^2} + g_{KK}\sqrt{m^2/4 - m_{K^0}^2} \right)$$

→New propagator (Flatte’-like) ➔ 3 couplings disentangled

→Fixed phase for the resonant term + free phase for the “background”.

Parameters

$$g_{\varphi f\gamma}, g_{f\pi+\pi-}, m_f, a_0, a_1, b_0, b_1, g_{\pi\pi} = \frac{g_{f\pi\pi}^2}{8\pi m_f^2} = \frac{3 g_{f\pi+\pi-}^2}{16\pi m_f^2}, g_{KK} = \frac{g_{fKK}^2}{8\pi m_f^2}$$

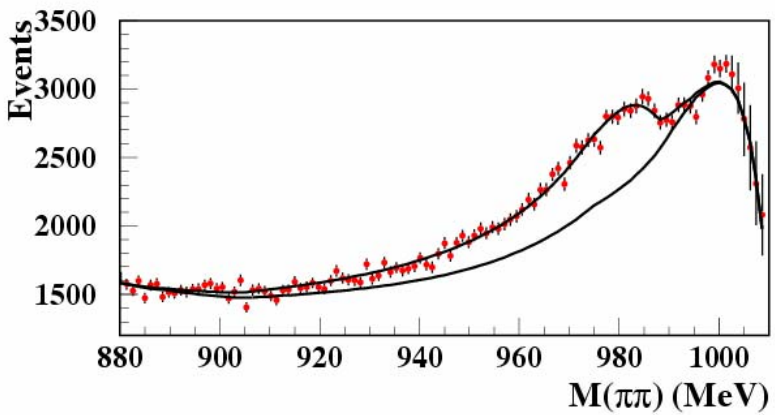
$$R = \frac{g_{fKK}^2}{g_{f\pi+\pi-}^2} = \frac{3}{2}\frac{g_{KK}}{g_{\pi\pi}}$$

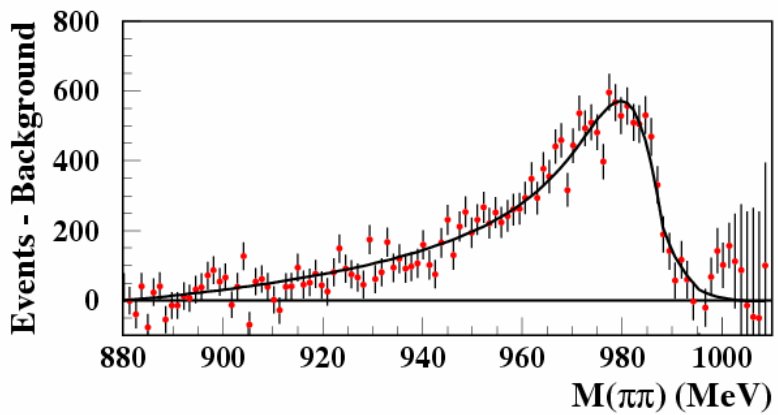
$$\Gamma_f = \Gamma_f(m_f) = \left(g_{\pi\pi}\sqrt{m_f^{\,2}/4 - m_\pi^2} \right)$$

Fit result (7 parameters + non-scalar parameters)

$\chi 2$	gg	m_f (MeV)	$g_{\pi\pi}$	g_{KK}	a_0	a_1	$b_0 = b_1$ (rad/GeV)
525.1 /478	1.25	979.3	.056	.079	6.00	5.98	0.45

$P(\chi 2)$	=			(6.7%)
$g_{f\pi\pi}$	=	$[8\pi m^2_f\, g_{\pi\pi}]^{1/2}$	=	1.1 GeV
g_{fKK}	=	$[8\pi m^2_f\, g_{KK}]^{1/2}$	=	1.4 GeV
R	=	$3/2\, g_{KK}/g_{\pi\pi}$	=	2.1
$g_{\phi f\gamma}$	=	$\sqrt{3}/2\, gg / g_{f\pi\pi}$	=	1.4 GeV^{-1}
$\Gamma(f\rightarrow\pi\pi)$	=	$g_{\pi\pi}[m^2_f/4 - m^2_\pi]^{1/2}$	=	26.2 MeV





2 comments:

(1) the charge asimmetry is the most powerful tool to investigate the low mass part of the m($\pi\pi$) spectrum;
➔ Test of the “No Structure” amplitude should be done.

(2) from the fit of the spectrum
➔ f_0 parameters OK ($g_{\phi f\gamma}$, $g_{f\pi\pi}$, g_{fKK});
➔ Test of σ insertion in the amplitude should be done (probably $\pi^+\pi^-$ not the best place to investigate it) to see also the effects on the f_0 parameters