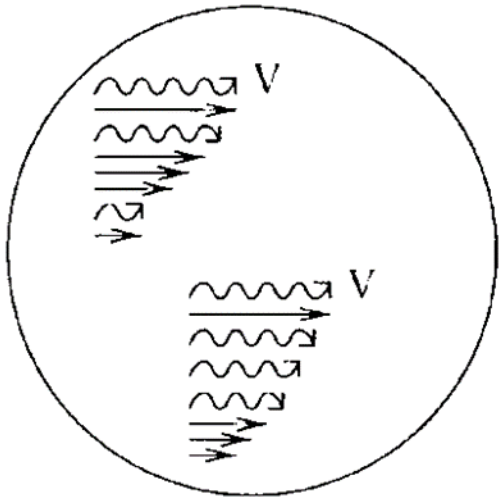
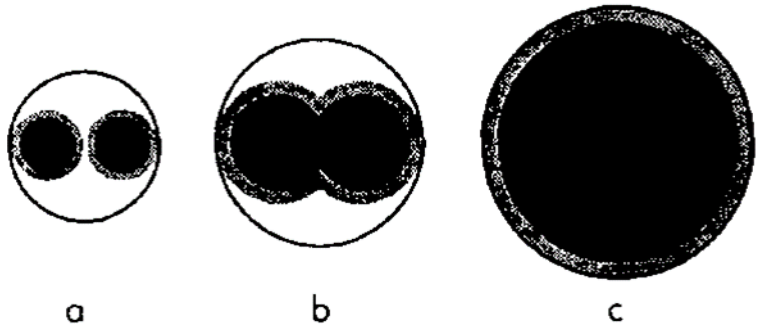
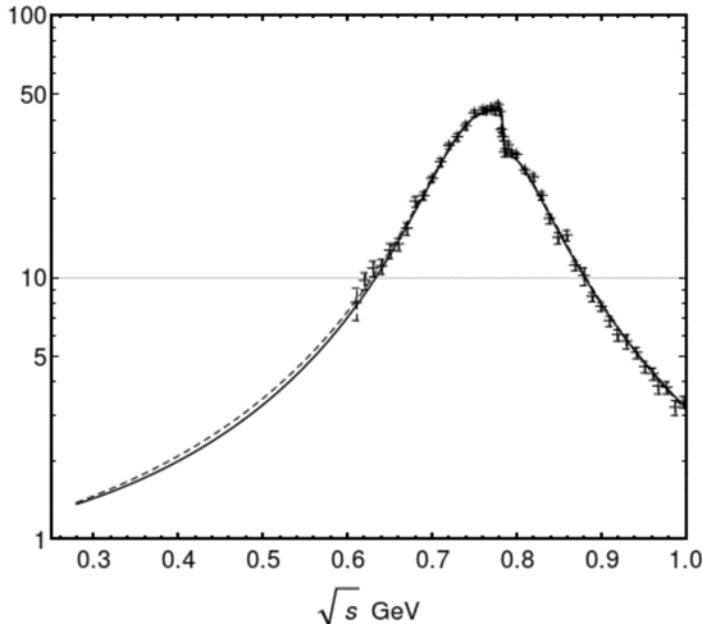


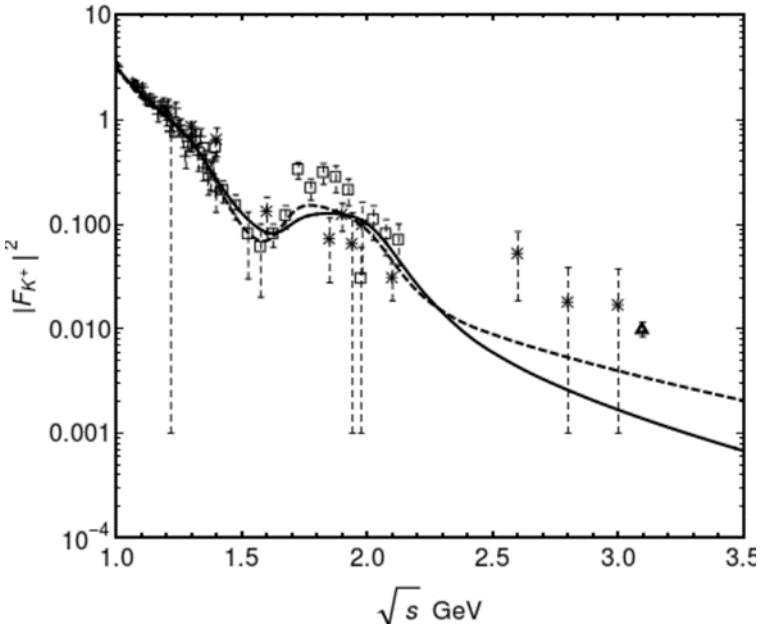
μέσος

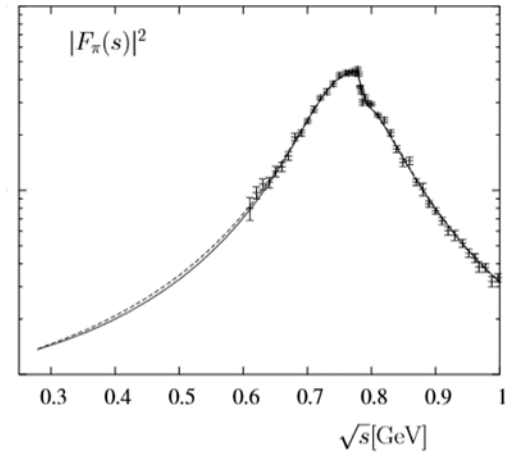


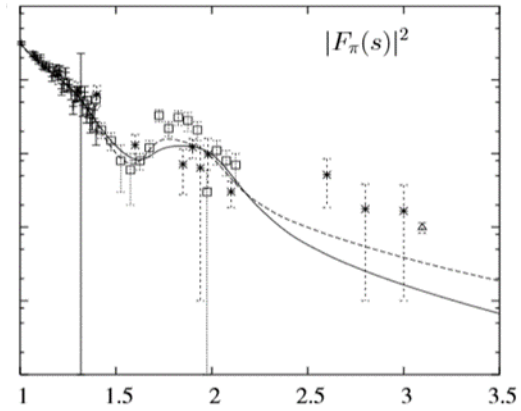
π-Mesons and Added Meson Resonances

Comparing Graphs of Pion Form Factor Data

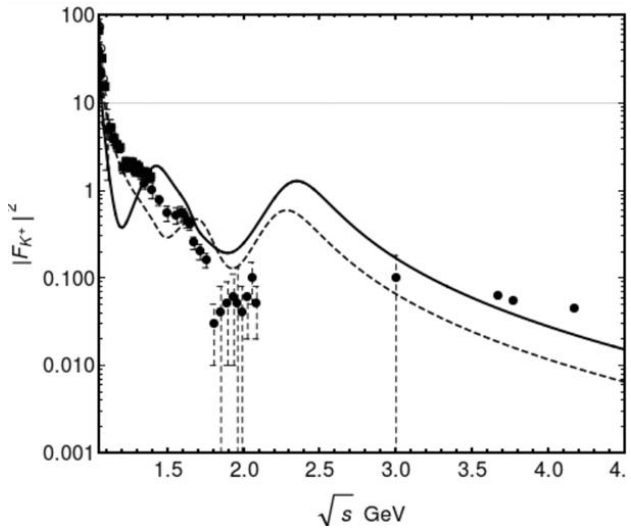


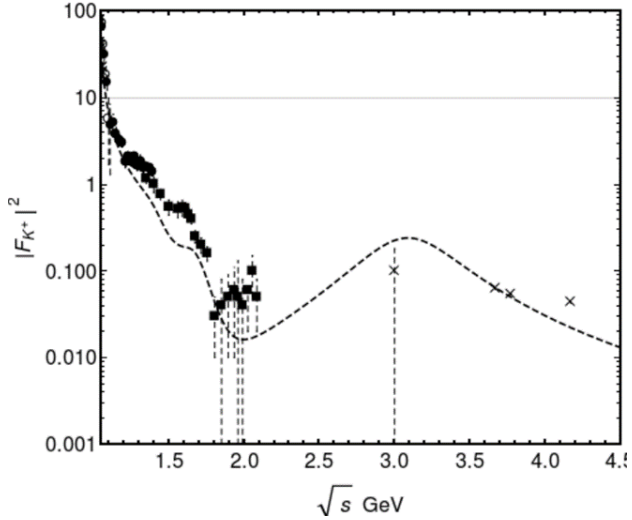






Non-Linear Modeling with Added Resonances





$\omega(2330)$ $I^G(J^{PC}) = 0^-(1^{--})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2330 ± 30	435 ± 75	ATKINSON	88	OMEG	25–50 $\gamma p \rightarrow \rho^{\pm}\rho^0\pi^{\mp}$

$\rho(2270)$ $I^G(J^{PC}) = 1^+(1^{--})$

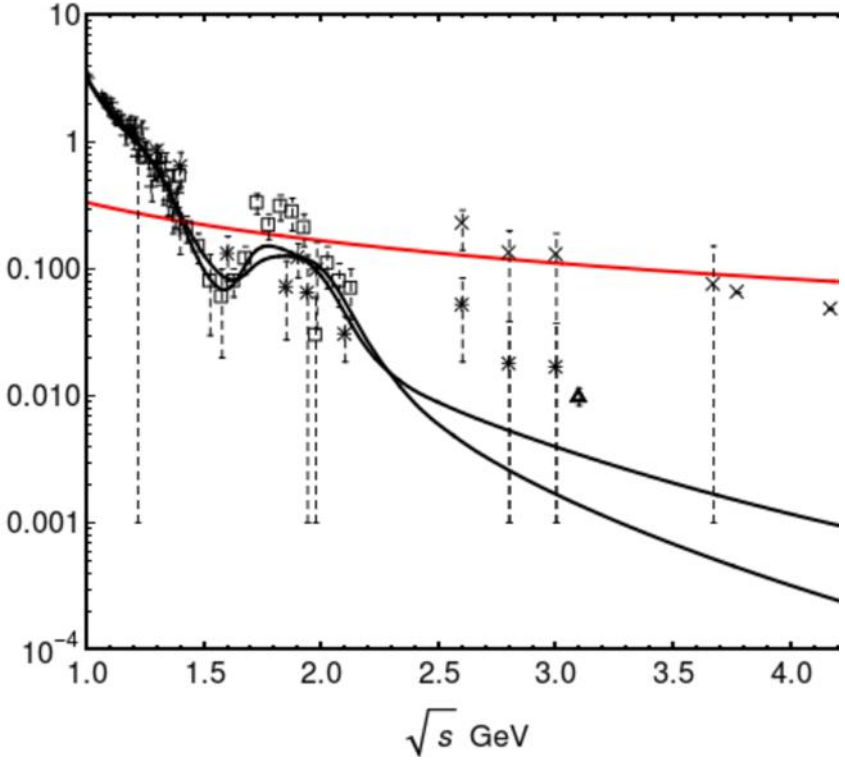
MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
2265 ± 40	325 ± 80	[49] ANISOVICH	02	SPEC	0.6–1.9 $p\bar{p} \rightarrow \omega\pi^0$, $\omega\eta\pi^0$, $\pi^+\pi^-$
2280 ± 50	440 ± 110	ATKINSON	85	OMEG	20–70 $\gamma p \rightarrow p\omega\pi^+\pi^-\pi^0$

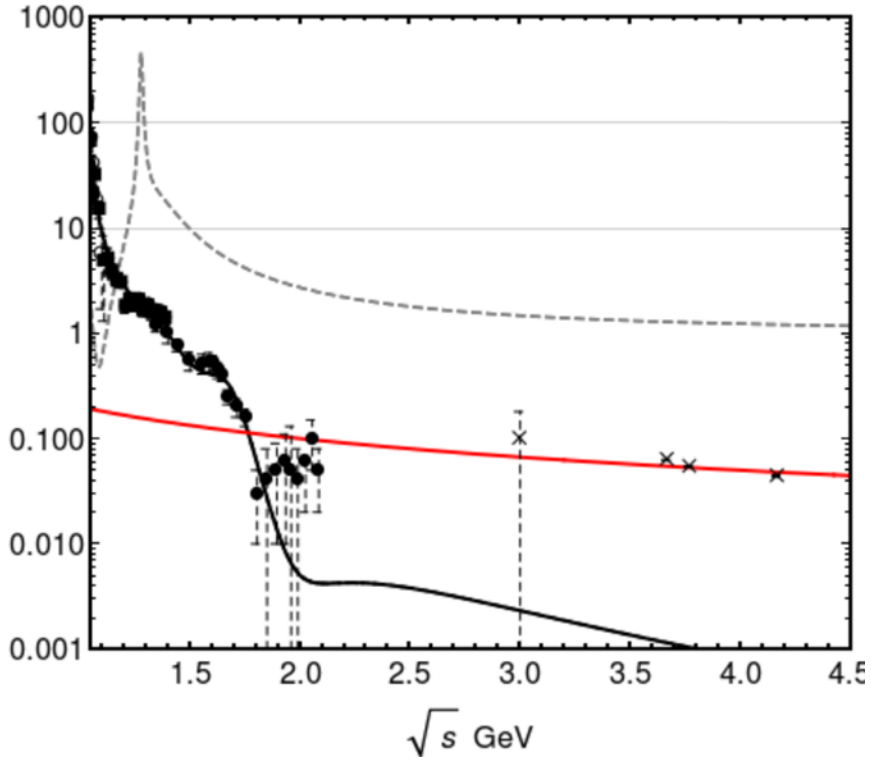
[49] From the combined analysis of ANISOVICH 00J, ANISOVICH 01D, ANISOVICH 01E, and ANISOVICH 02.

$f_6(3100)$ $I^G(J^{PC}) = 0^+(6^{++})$

MASS (MeV)	WIDTH (MeV)	DOCUMENT ID		TECN	COMMENT
3100 ± 100	700 ± 130	BINON	05	GAMS	33 $\pi^- p \rightarrow \eta\eta n$

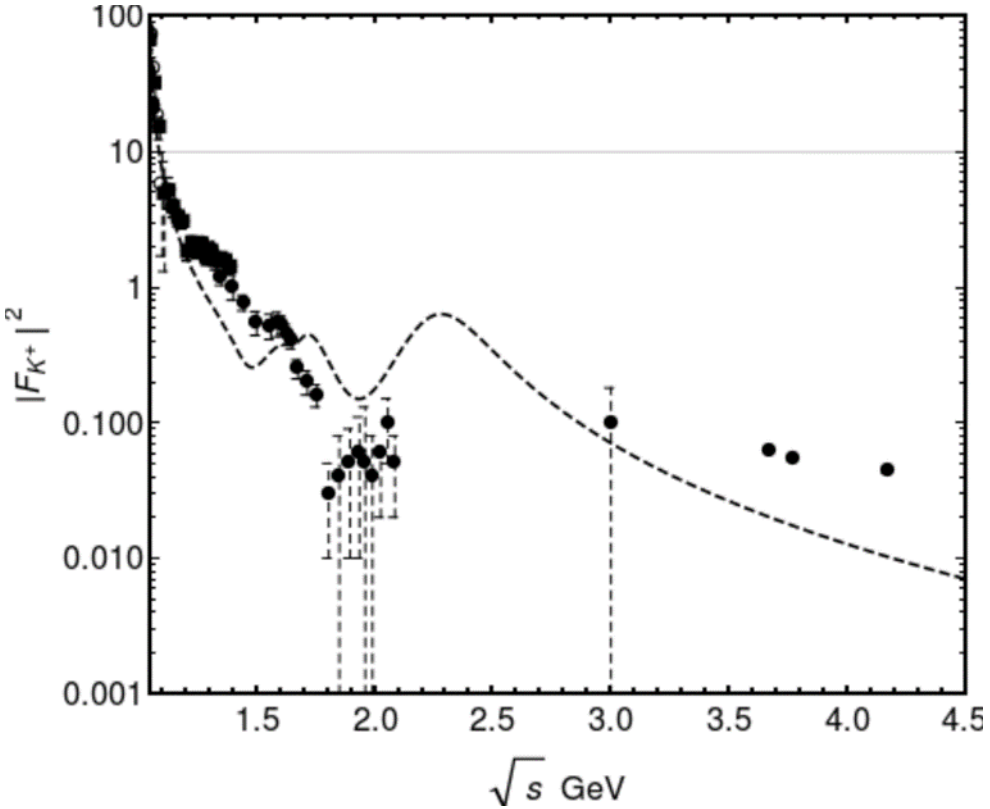
Possible Inverse Relation in High-Energy Data





Attempt to Solve for η-Coefficient

$$F_{K^0} = -\frac{1}{2}\left(c_\rho^K BW_\rho + c_{\rho'}^K BW_{\rho'} + c_{\rho''}^K BW_{\rho''}\right) + \frac{1}{6}\left(c_\omega^K BW_\omega + c_{\omega'}^K BW_{\omega'} + c_{\omega''}^K BW_{\omega''}\right) + \frac{1}{6}\left(\eta_\varphi c_\varphi^K BW_\varphi + c_{\varphi'}^K BW_{\varphi'}\right)$$



$$\eta_\varphi(s) = 1 + (\eta_\varphi - 1)\theta\left(\sqrt{s} - (m_\varphi - \Gamma_\varphi)\right)\theta(m_\varphi + \Gamma_\varphi - \sqrt{s})$$

η(2190) $I^G(J^{PC}) = 0^+(0^{-+})$

MASS (MeV)	*WIDTH* (MeV)	*DOCUMENT ID*		*TECN*
2190±50	850 ± 100	BUGG	99	BES

Upcoming Tasks

- Extend graph to investigate space-like data points.
- Run non-linear modeling for kaon data.
- Evaluate slope at $\sqrt{s} = 0$ and compare with literature.
- Investigate η-coefficient in greater detail.

Olive, K.A. et al. 2014. “The Review of Particle Physics,” in *Chin. Phys.* C 38, 090001. (2015) http://pdg.lbl.gov/2015/listings/

Bruch, C. et al. 2005. “Modeling the pion and kaon form factors in the timelike region,” in *European Physics Journal C* 39, 41-54. (2004)

Anisovich, V.V., Kobrinsky, M.N., Nyiri, J. and Shabelshi, Yu. M. 2004. *Quark Model and High-Energy Collisions.* World Scientific Publishing Co. Pte. Ltd., River Edge, NJ. (6-17)

Mecholsky, Nicholas. 2016. “Kaon Form Factor and Transverse Charge Density.” Mathematica Notebook. (June 17th)

Mecholski, Nicholas. 2016. “Pion Form Factor.” Mathematica Notebook.

The End