A Study of $\gamma p \to K_S K_S p$ with the GlueX Experiment

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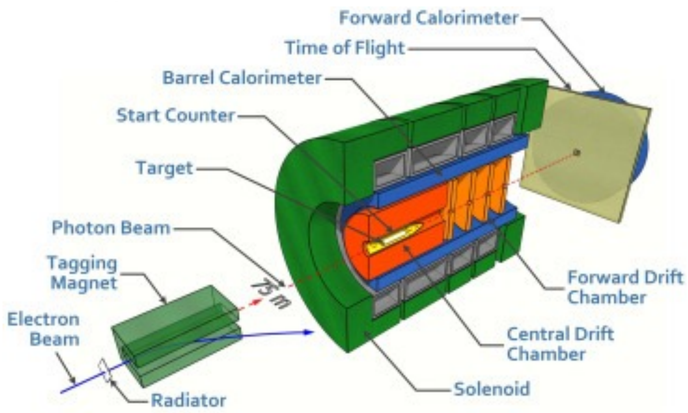
Introduction

- The GlueX Experiment studies the photoproduction of hadrons.
- The first phase of data collection is complete and is under analysis with a second campaign underway.
- The lightest glueballs are expected to have $\mathbf{J^{PC} = 0^{++}}$ and $\mathbf{2^{++}}$.
- Mesons that decay to $K_S K_S$ have $\mathbf{J^{PC} = even^{++}}$.
- The $K_S K_S$ final state has been studied with the GlueX phase 1 data set.

GlueX Experiment

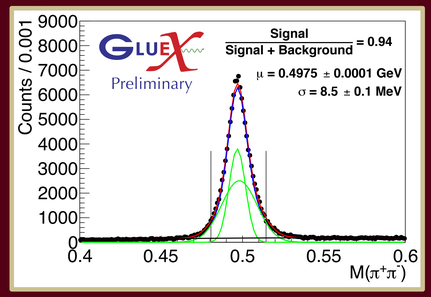
- Photon beam energy up to 12 GeV with a linearly polarized coherent peak at ~9 GeV.
- Near 4π hermetic detector for charged and neutral particles.



Event Selections

- Missing Mass Squared $< 0.04\ \mathrm{GeV}^2$
- Beam Energy > 6.5 GeV
- Mandelstam-t > $-1\ \mathrm{GeV}^2$
- $\chi^2_{\text{Kinematic fit}}/\text{ndf} < 4$
- $\dfrac{|\vec{x}_{K_S} - \vec{x}_{\text{proton}}|}{\sqrt{\sigma^2_{K_S} + \sigma^2_{\text{proton}}}} > 4\sigma$

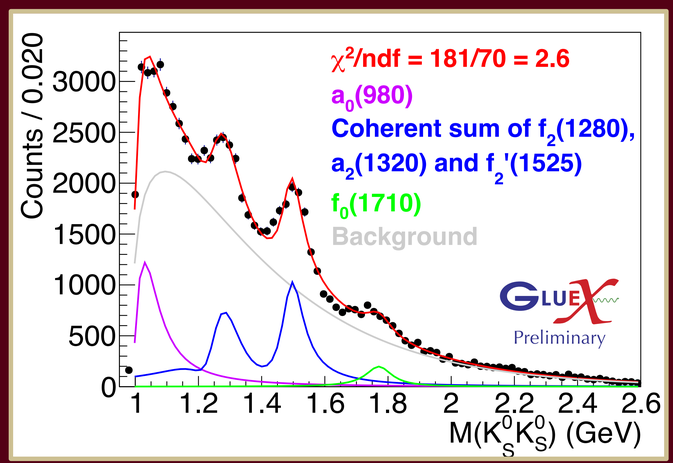
K_S Mass Distribution



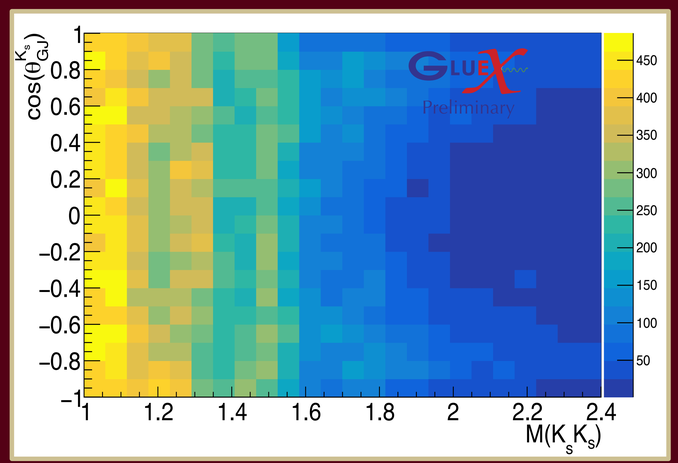
0^{++} and 2^{++} Mesons

- $a_0(980)$
- $f_0(980)$
- $f_2(1270)$
- $a_2(1320)$
- $f_0(1370)$
- $f_0(1500)$
- $f_2'(1525)$
- $a_2(1700)$
- $f_0(1710)$
- $f_2(1950)$

$K_S K_S$ Mass Distribution



$K_S K_S$ Angular Distribution



Final Remarks

- A clean sample of $K_S K_S p$ events has been extracted from the GlueX phase 1 data.
- Separating the contribution of several mesons is a key challenge in this analysis.
- A Partial Wave Analysis is ongoing.

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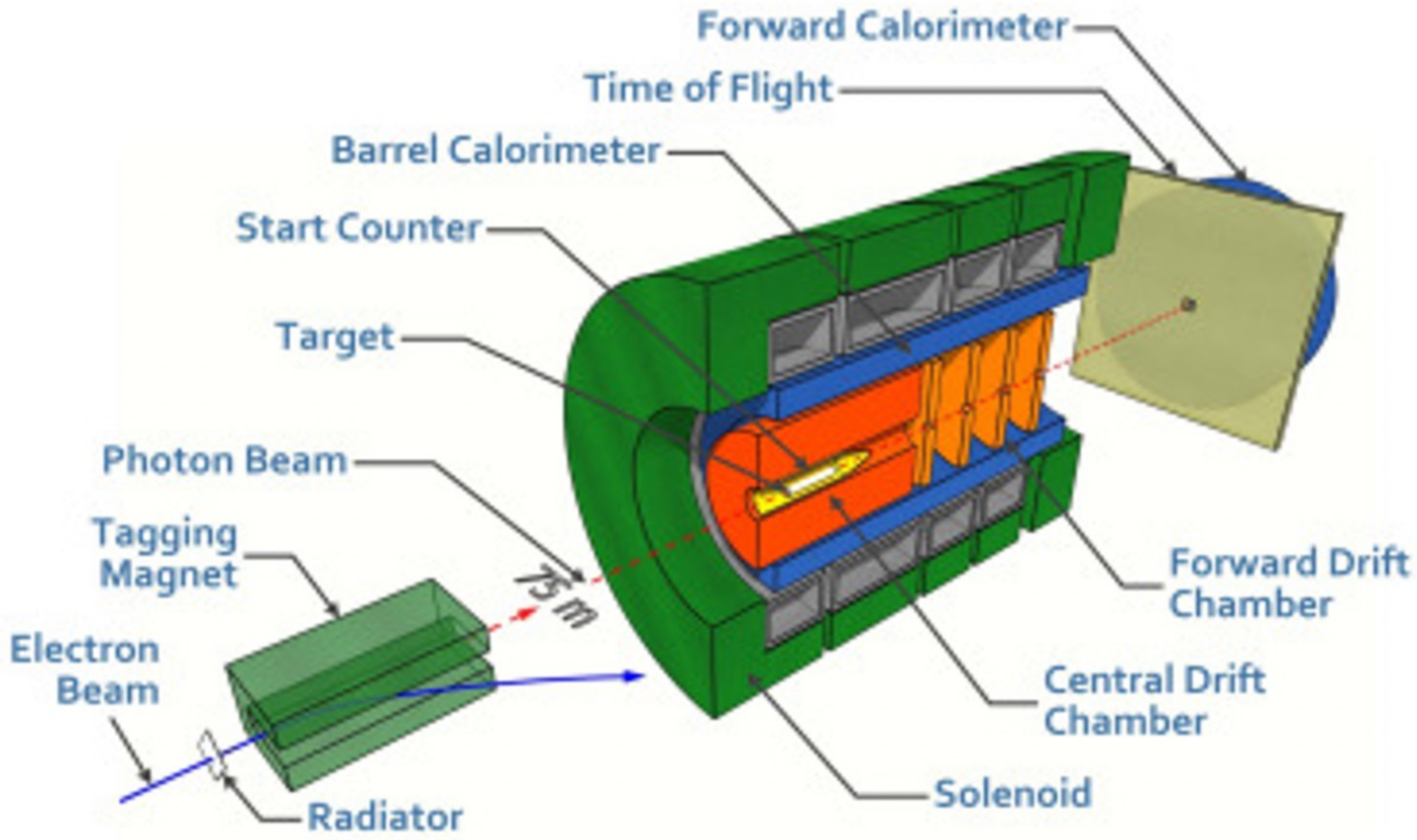

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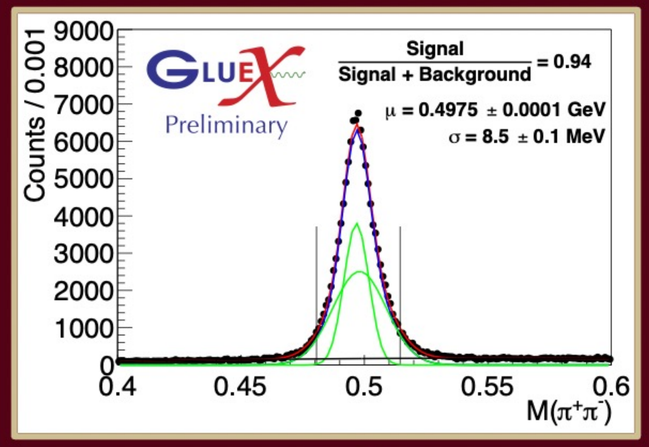

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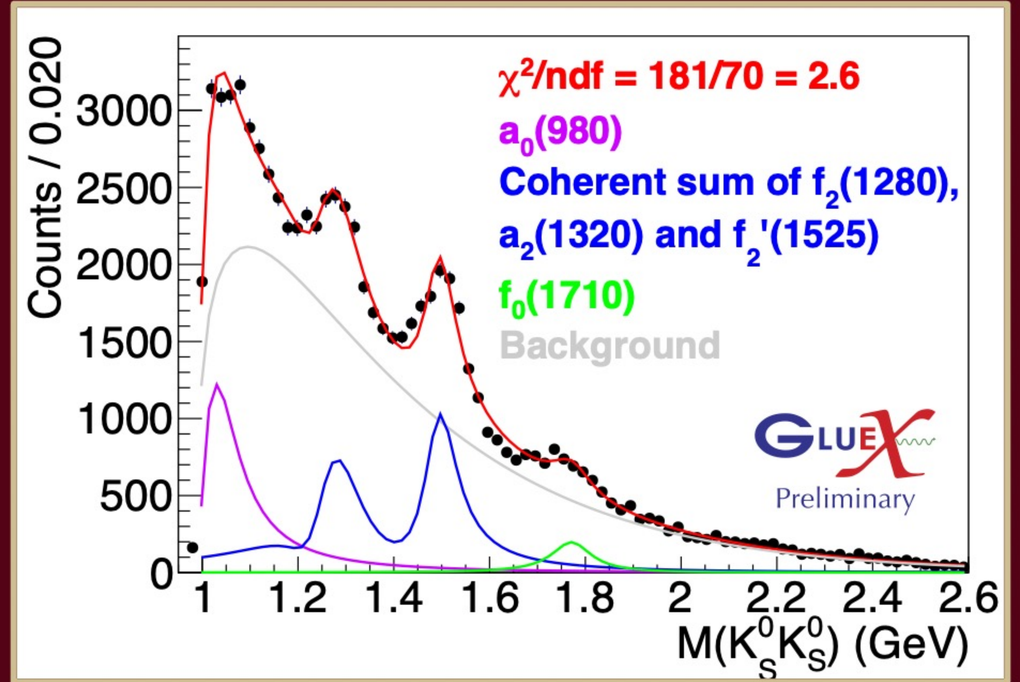
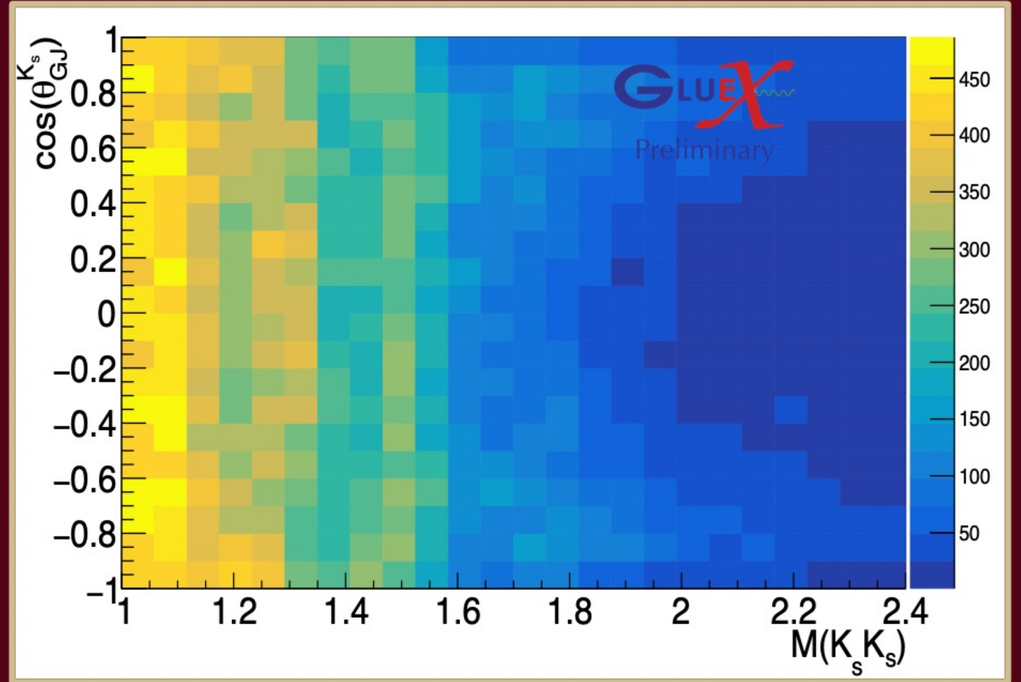
K_SK_S Mass Distribution



K_SK_S Angular Distribution



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