

# Reconstruction of $\omega$ in p+C collisions at 30 GeV with ECAL

S. M. Kiselev

ITEP, Moscow, Russia

The feasibility of  $\omega$  reconstruction by its decay  $\omega \rightarrow \pi^0\gamma$  using the ECAL was studied on a sample of  $10^6$  p+C (b=0 fm) events from UrQMD at 30 GeV (geometry and release as provided in [1], previous page). The invariant mass spectrum of  $\gamma\pi^0$  tracks is displayed in Fig. 1.  $\gamma\pi^0$  pairs within an invariant mass interval of  $0.77 < M_{\gamma\pi^0} < 0.79$  GeV are taken as "primary"  $\omega$ .

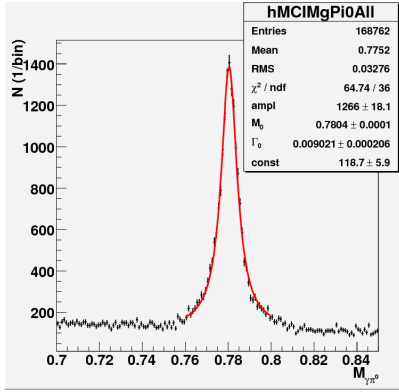


Figure 1: Invariant mass distribution of  $\gamma\pi^0$  pairs for p+C at 30 GeV, fitted by a Breit-Wigner function (red line).

About 50 % of "vertex" photons are lost in the detector systems placed before the ECAL (RICH, TRD and TOF) [2]. In case of the  $\omega$  reconstruction photons above 1 GeV/c momentum were used. The resulting  $\gamma\gamma$  invariant mass distribution is shown in Fig. 2. For  $\pi^0$  candidates the pairs with  $m_{\pi^0} - 2\sigma < M_{\gamma\gamma} < m_{\pi^0} + 2\sigma$  were selected,  $\sigma=7.2$  MeV.

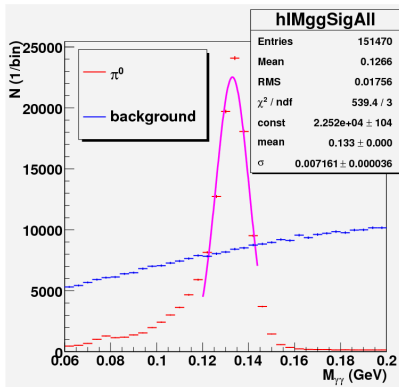


Figure 2: Invariant mass distributions of signal (red) and background (blue) of  $\gamma\gamma$  pairs for p+C at 30 GeV

Fig. 3 depicts the invariant mass distributions of  $\gamma\pi^0$  pairs. We obtain a signal-to-background ratio (S/B) of about 0.7 % with a significance of 0.9. In order to achieve

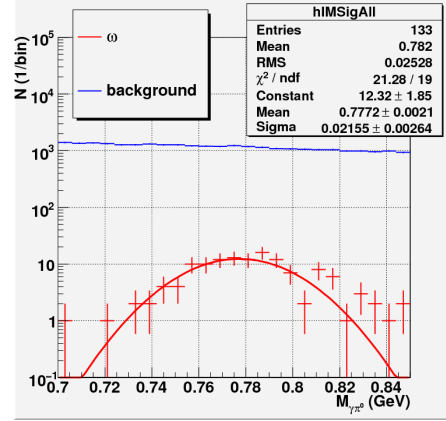


Figure 3: Invariant mass spectra of signal (red) and background (blue)  $\gamma\pi^0$  pairs for p+C at 30 GeV

a reasonable significance level of about 10, event statistics of the order of  $10^8$  is required. The main characteristics of the analysis are summarized in Table 1. With the current statistics (133 reconstructed signal pairs) it is not possible to study the dependence of S/B on transverse momentum. The physical motivation for the presented investigation as well as more analysis details can be found in [3].

Table 1: Main characteristics of the  $\omega$  analysis for p+C at 30 GeV

characteristic	value
statistics (events)	$10^6$
yield/event	0.015
acceptance efficiency	4 %
reconstruction efficiency	73 %
cut efficiency	30 %
total efficiency	0.9 %
$\sigma$ (MeV)	22
S/B $_{2\sigma}$	0.7 %
significance	0.9

## References

- [1] S. M. Kiselev, *Reconstruction of  $\Sigma^+$  in p+C collisions at 30 GeV with ECAL*, this report
- [2] S. M. Kiselev, *CBM Progress Report 2009*, Darmstadt 2010, p. 69
- [3] S. M. Kiselev, *Reconstruction of  $\omega \rightarrow \pi^0\gamma$  with ECAL in p+C at SIS100*, 16th CBM collaboration meeting, September 27- October 1, 2010, Mamaia, Romania