$\phi \to \eta'\gamma \to \pi^+\pi^-\ 7\gamma$
referee report

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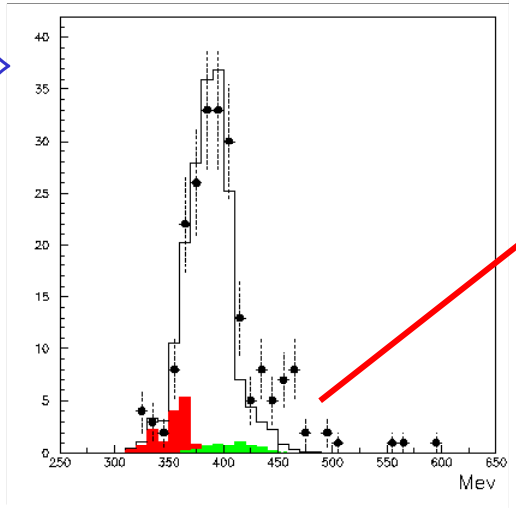
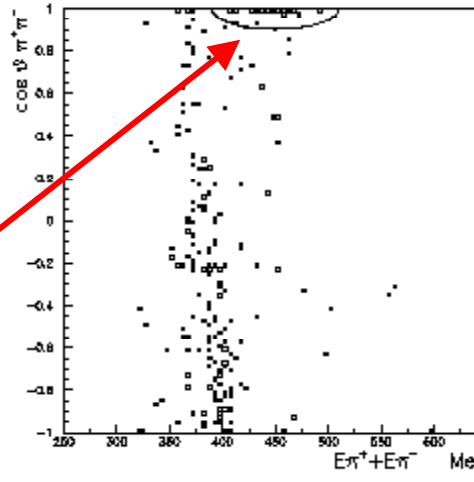
- **Referees' requests on:**
  - **analysis refinements**
  - **better systematics evaluation**
  - **final result extraction/background subtraction**

• Analysis refinements:

– time window for prompt photons
$5\sigma_t \Rightarrow \min(5\sigma_t, 2\ \text{ns})$, otherwise too many low energy accidentals

– try to understand this bckg ⇒





– kinematic fit: tune the resolutions on the fit variables to get similar χ^2 distributions for data and MC (the χ^2 cut seems to give the most relevant contribution to the systematic error on ε_{sel})

- Systematics evaluation:

  – systematics from Filfo and ECL taken from $\phi \rightarrow \eta'\gamma \rightarrow \pi^+\pi^- 3\gamma$
  $\Rightarrow$ should be evaluated from the decay under study
  but combining the errors $\Rightarrow \sim 4\%$,
  while stat.+bckg subtraction $\approx$ 10—12 %
  – systematics on photon detection evaluated without
  Recover-Splitting, and without correction for photon efficiency
  in MC
  – comment: I don't like the method of dividing the
  data-MC discrepancy into 2 parts: 50% to correct efficiency
  and the other 50% considered as systematic error
  $\Rightarrow$ if you understand the discrepancy $\Rightarrow$ correct for
  otherwise put it in the systematics

- Final result extraction:

  – 0 MC evts. found for $\phi \to K_S K_L$, $K_S \to \pi^+\pi^-$ and $K_L \to 3\pi^0$, means an upper limit of 10 evts. @ 68% CL (18 @ 90% CL) (signal = 133 evts.)

  $\Rightarrow$ more MC statistics is needed for that decay ($O(10^6)$ evts.; now 3×10^5)

  – the total uncertainty (stat. + syst.) on the final result seems to be overestimated: the error on N-B is doubly counted, both in the statistical and in the systematic errors

- Work to be done:

  – more MC data on $\phi \rightarrow K_S K_L$ with $K_S \rightarrow \pi^+ \pi^-$ and $K_L \rightarrow 3\pi^0$
  – rerun the analysis on data and MC

- Schedule: all the reanalysis should be completed by the end of October ($\Rightarrow$ updated version of Memo 268 ?)
  MC production ?

  we will meet Camilla next week, for a status report

- Concluding remarks:
  - the work is well advanced, some refinement is needed
  - systematics have to be better evaluated
  - this result obtained with the usual 16.3 pb^{-1} of 2000 data
    $Br(\phi \to \eta'\gamma) = (7.05 \pm 0.61 \, {}^{+0.94}_{-0.97}) \times 10^{-5}$ is
    better than previous measurements:
    SND: $(6.7 \, {}^{+3.4}_{-2.9} \pm 1.0) \times 10^{-5} \Rightarrow$ PDG 2002 value
    CMD-2: $(8.2 \, {}^{+2.1}_{-1.9} \pm 1.1) \times 10^{-5}$
    and is in agreement within 1σ with the KLOE published
    $Br(\phi \to \eta'\gamma) = (6.10 \pm 0.67 \pm 0.45) \times 10^{-5}$ $(\phi \to \eta'\gamma \to \pi^+\pi^- 3\gamma)$

  $\Rightarrow$ can be published without waiting for the analysis of the 2001 data