

# Photon Structure Function

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**March 08, 2004**  
L3 EAM, CERN

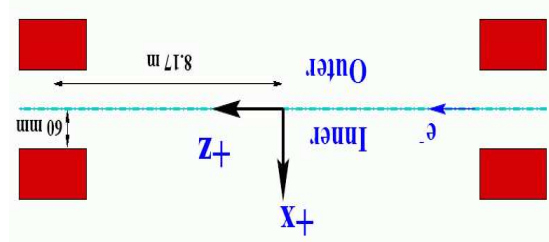
Primal aim: *Hadronic  $F_2^\gamma(x, Q^2)$*  with VSAT, ALR, and BGO-endcaps

## *Investigation of VSAT*

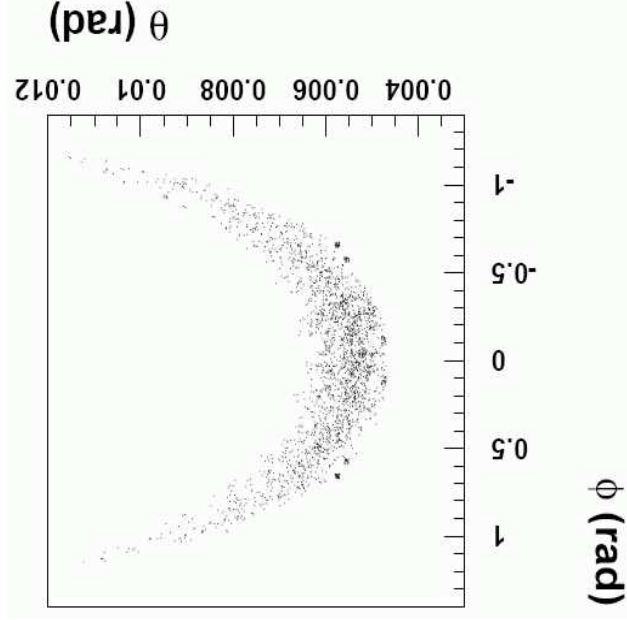
- ▶ VSAT consists of *four* boxes with 24 BGO crystals each.
- ▶ Positioned in the horizontal plane on each side of the beam pipe.
- ▶ Positioned behind the first quadrupole magnets.
- ▶ Quadrupole volume inside the beam pipe into horizontal ellipse overlaying the VSAT.

# VSAT Geometries

Coordinate system of VSAT boxes:

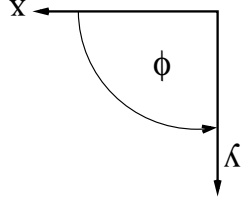
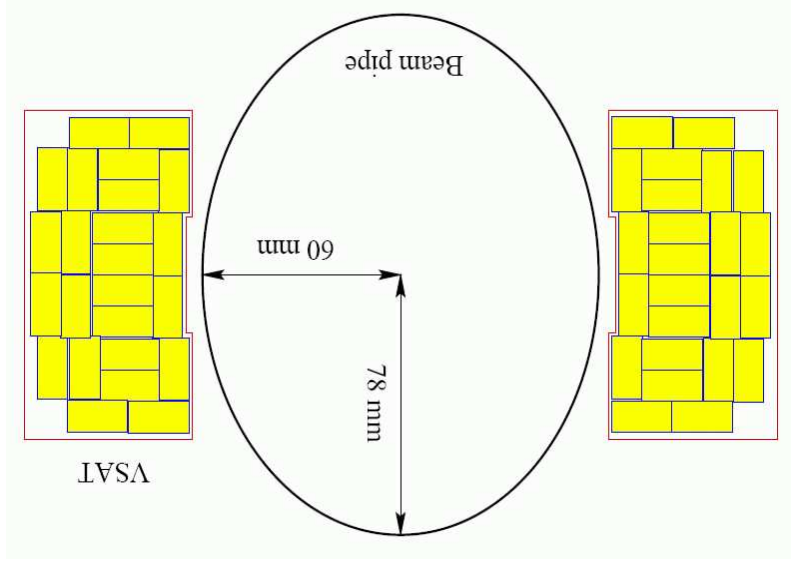


VSAT acceptance:



T. van Rhee et al., L3 Note 2117

XY-view of the VSAT boxes:

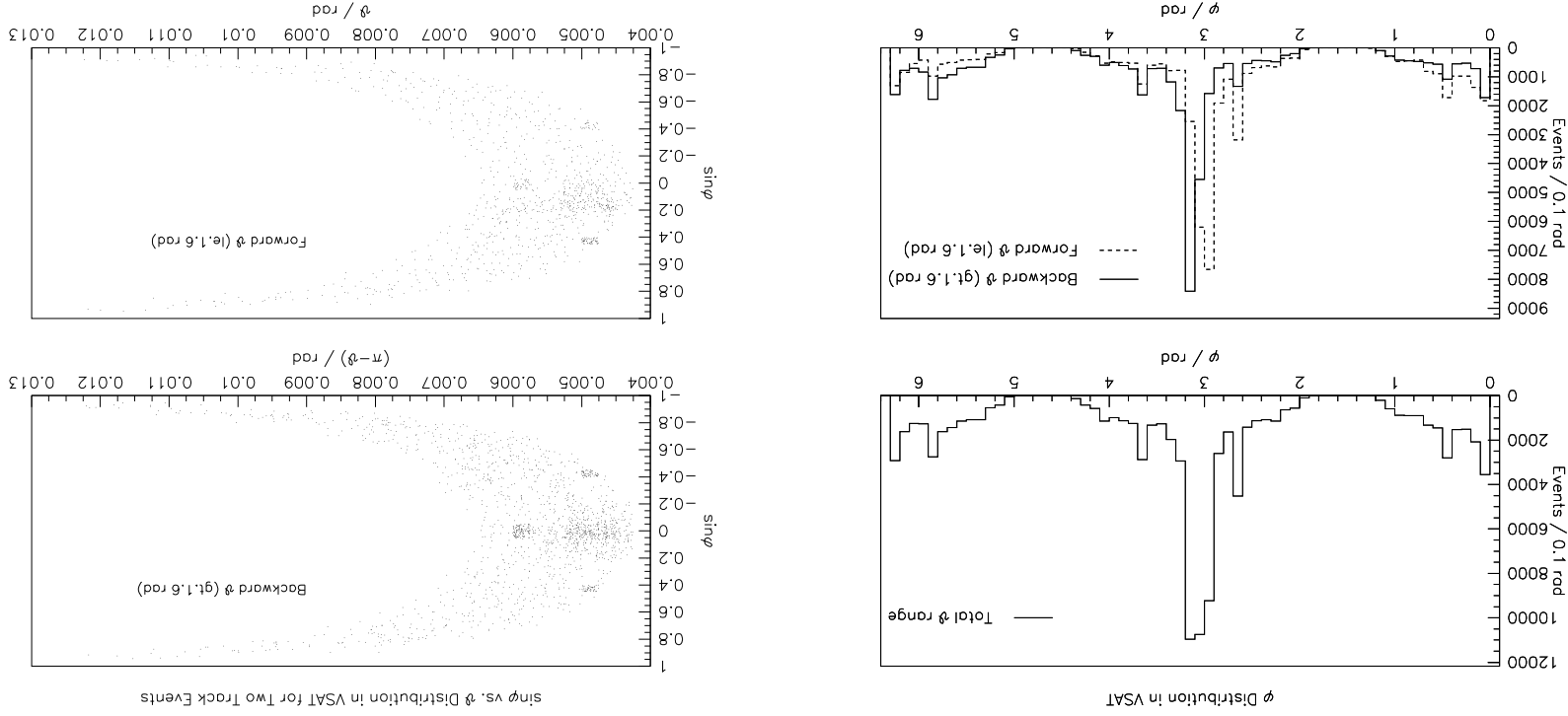


## Using Di-Lepton production

- Using lepton pairs to calibrate and align VSAT
  - $e^+e^- \rightarrow e^+e^- \gamma \rightarrow e^+e^-l^+l^-$  in single tag configuration
  - QED  $O(\alpha^4)$
  - Using in particular  $\mu^+\mu^-$
- $Q^2 \simeq 2 \cdot E_{tag} \cdot E_{beam} \cdot (1 - \cos\theta_{tag}) \Rightarrow Q^2 = (\sum_{i=1}^2 \vec{p}_{T,i})^2$ 
  - Using two-track information and identification of  $\mu$ 's
  - Using VSAT energy-angle information
  - LEP2 data sample,  $\sqrt{s} = 189 \text{ GeV} \rightarrow 206 \text{ GeV}$

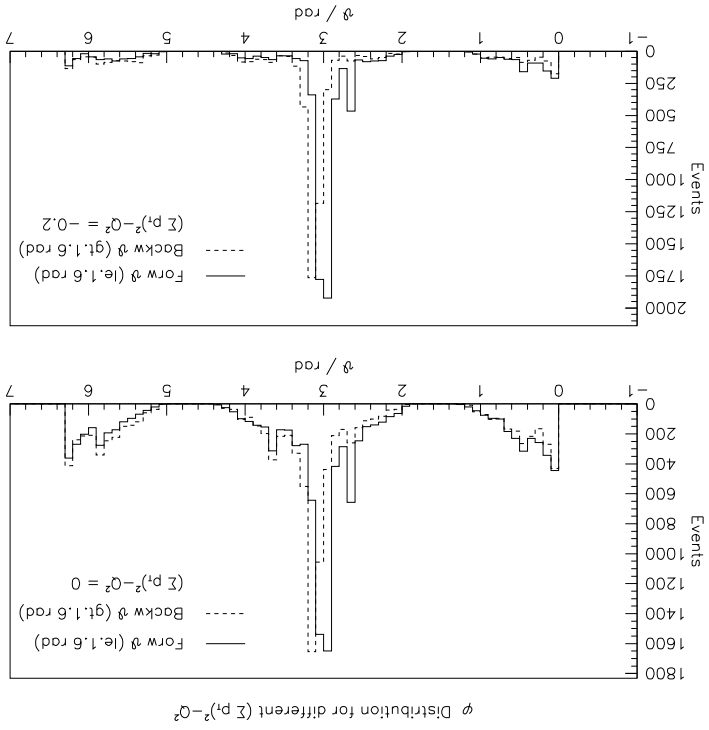
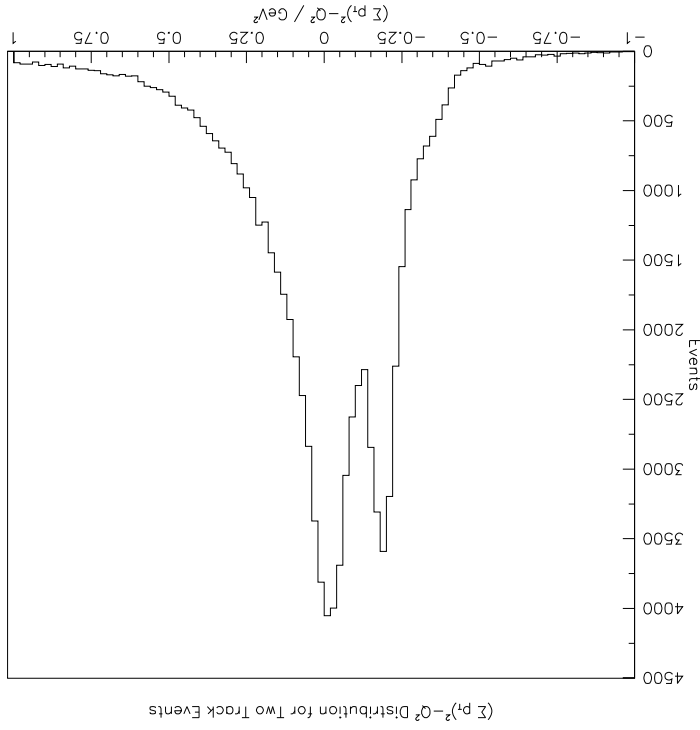
# VSAT Misalignment ?

- Started rough selection of single tagged events for 1998-sample
- Excessive events at selected angles ( $\phi$ )
- It shows asymmetry in  $\phi$  between forward and backward VSAT



# Off-Momentum Electrons ?

- Shows  $(\sum_{i=1}^2 \vec{p}_{T,i})^2 - Q^2 \neq 0$
- Region around  $(\sum_{i=1}^2 \vec{p}_{T,i})^2 - Q^2 \approx 0$  does not get rid of spikes in  $\phi$ -distribution



## Plans

- Subdivide  $(\sum_{i=1}^2 \vec{p}_{T,i})^2 - Q^2$  region into three regions:
  - $\sum_{i=1}^2 \vec{p}_{T,i})^2 - Q^2 \approx 0$
  - $(\sum_{i=1}^2 \vec{p}_{T,i})^2 - Q^2 \approx -0.2$
  - Rest
- Investigation of the characteristics of the particular regions.
- Realignment with two muon tracks and reconstruction of the kinematics.
- VSAT Energy-calibration.

- Continue with Di-Lepton events and measure *leptonic*  $F_\gamma^2(x, Q^2)$  as well as  $F_\gamma^T \propto \sigma_{TL}$  by means of azimuthal correlations in the  $\gamma\gamma$ -CM system  $\rightarrow$  measuring the interference term  $A_2$  from single tagged Two-Photon events.

