

Introduction to the Meeting

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FCAL workshop Krakow, May 2018

Mission of FCAL

R&D for technologies to measure the luminosity at e+e- colliders

- Develop concepts for luminometers installed in different detector designs
- Optimise the performance of luminometers using Monte Carlo techniques
- Construction of prototypes of major components
 - mechanics
 - sensors
 - FE electronics
 - Readout
 - alignment
- Performance studies in test-beams- proof of principle

Linear e^+e^- Collider

Currently discussions to prepare the European Strategy

In Germany several workshops happened. A summary was given beginning of May. Major statements (not for public yet)

- Full exploitation of the LHC (including HL LHC)
- Full support for BELLEII
- An e^+e^- collider with at least 500 GeV is of highest priority in the future

About ILC: wait for the recommendation of the MEXT committee. Hitoshi may inform us about the latest news.

About CLIC: Konrad will inform us.

We should be prepared for both projects

Circular e^+e^- collider

There are new circular collider projects coming up:

- CEPC Project in China (Ivanka will report)
- FCC at CERN (talk in Belgrade by Mogens Dam)

Questions we may ask:

- Which are the requirements there?
- Are there interesting technological developments?
- Can we use synergies ?
- Will new people join us?

Possible engagement at LHC

Luminosity, beam optimisation, radiation monitoring will play an important role at HL-LHC

- Systems should be independent on power/readout of the detectors
- On-line bunch-by-bunch luminosity with high precision in short time slots
- At least two independent luminosity systems per experiment

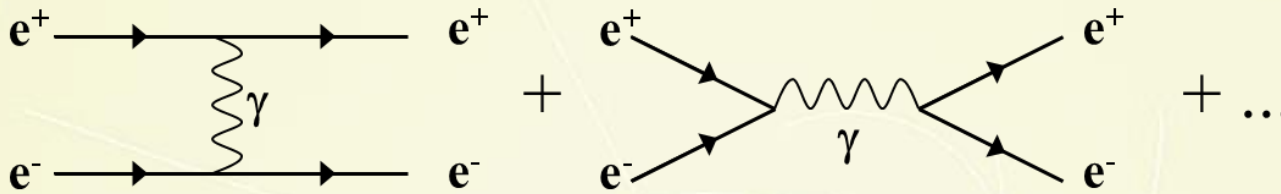
Technologies we developed may be applied for these purpose. For students it might be interesting to appply the acquired expertise in a running experiment

Paul and Witold will tell us more details about plans at ATLAS and CMS

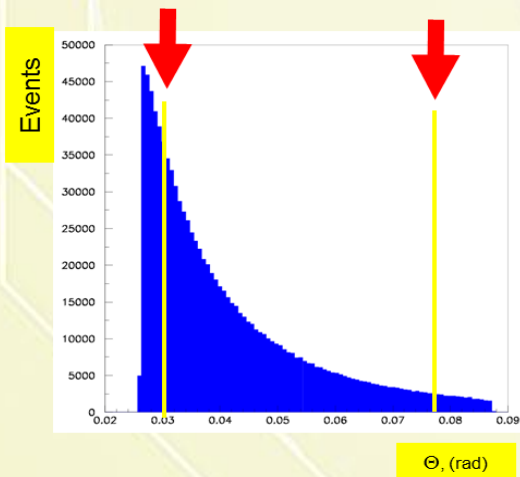
Bhabha Scattering

Bhabha scattering at low polar angles is used as a gauge process

$$e^+e^- \longrightarrow e^+e^- (\gamma)$$



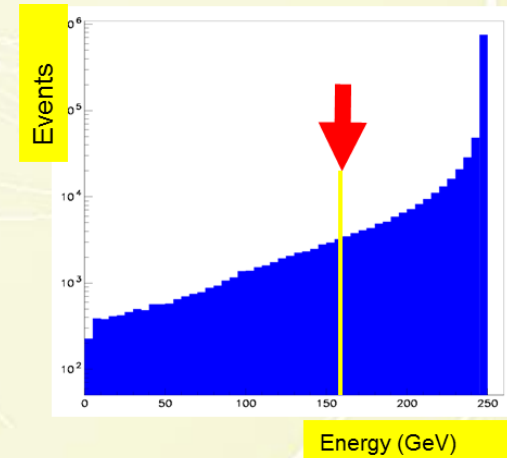
$$\frac{d\sigma_B}{d\theta} = \frac{2\pi\alpha_{em}^2}{s} \frac{\sin\theta}{\sin^4(\theta/2)} \approx \frac{32\pi\alpha_{em}^2}{s} \frac{1}{\theta^3}$$



$$\mathcal{L} = N / \sigma$$

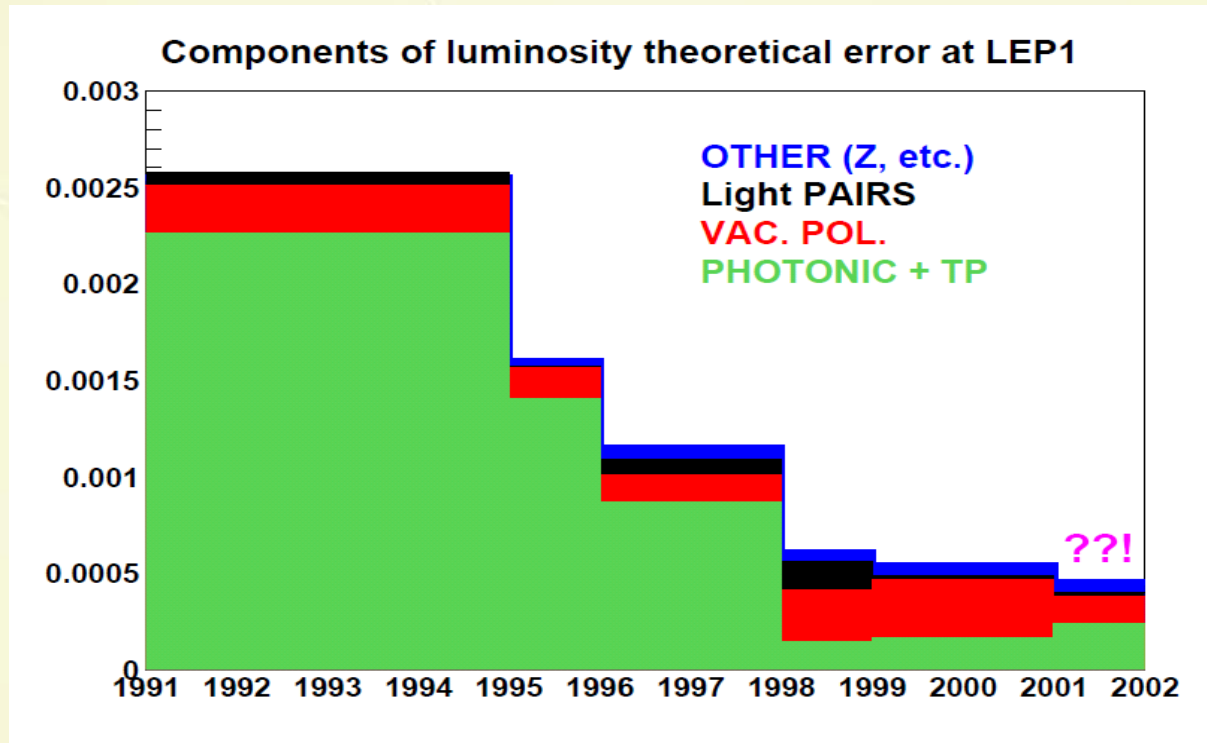
Count Bhabha events

From theory



Bhabha Scattering

Theory uncertainties in the Bhabha cross section at LEP1 (S. JADACH, FCAL workshop Cracow 2006):



There is a lack of MC generators optimized for higher energies. Activities e.g. in JINR and University of Minsk may be interesting for us for application

FCAL specific issues

Major Topic: detector prototype for beam tests (2019/20)

- Sensors (available, but to be qualified)
- Absorber planes (available, but need mechanical integration)
- Detector plane (technology under development)
- ASICs (to be produced)
- DAQ with FPGA in preparation
- Laser alignment?

FCAL specific issues

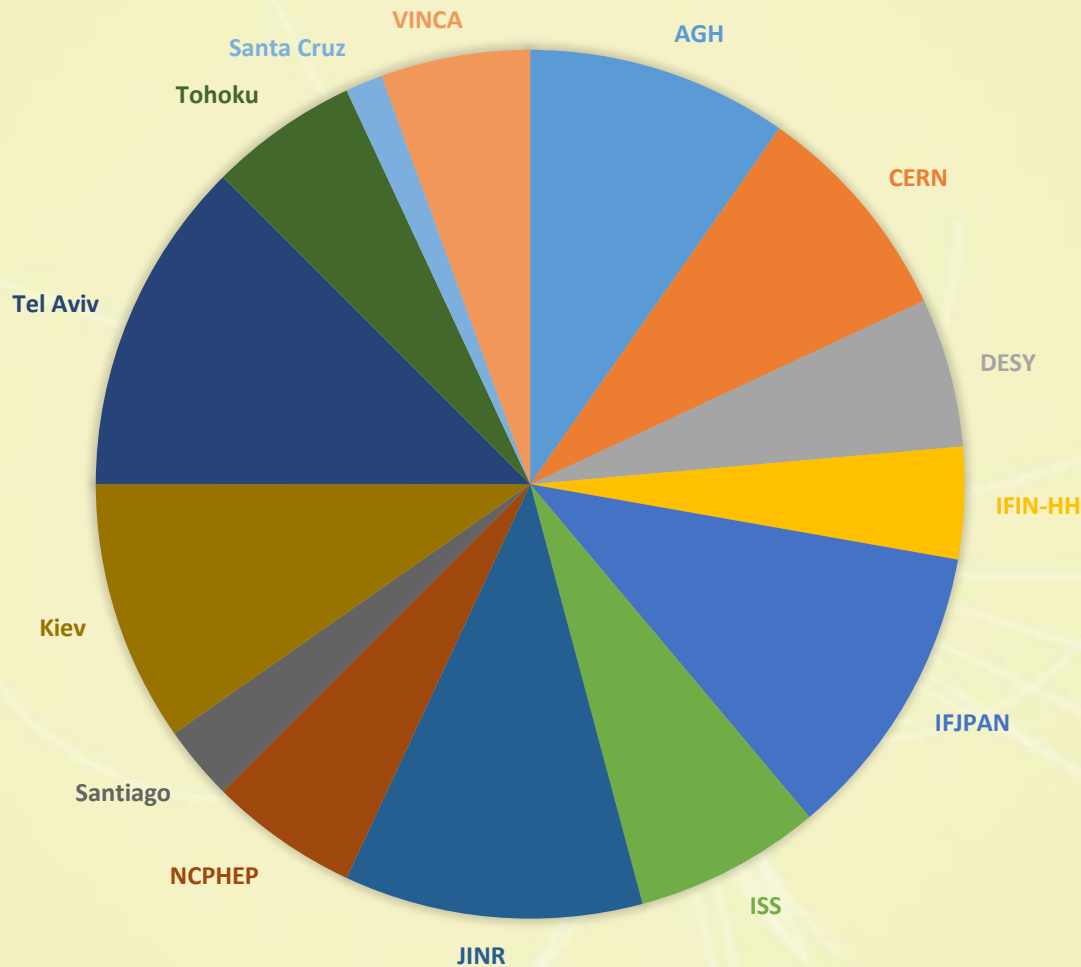
- Publications
 - Presence on conferences was very good.
 - Future topics?
 - One publication in „The European Physical Journal C“
 - New paper on irradiation studies
- Never finished topics
 - Calibration and alignment with muons (MC to be done)
 - CLIC timing, FE, readout, background → impact on performance
 - BeamCal/LumiCal performce in the new ILD software

Measurement of shower development and its Molière radius with a four-plane LumiCal test set-up

H. Abramowicz¹, A. Abusleme², K. Afanaciev³, Y. Benhammou¹, L. Bortko^{4,b}, O. Borysov¹, M. Borysova^{1,c}, I. Bozovic-Jelisavcic⁵, G. Chelkov⁶, W. Daniluk⁷, D. Dannheim⁸, K. Elsener⁸, M. Firlej⁹, E. Firtu¹⁰, T. Fiutowski⁹, V. Ghenescu¹⁰, M. Gostkin⁶, M. Hempel^{4,b}, H. Henschel⁴, M. Idzik⁹, A. Ignatenko^{3,d}, A. Ishikawa¹¹, S. Kananov¹, O. Karacheban^{4,b}, W. Klempt⁸, S. Kotov⁶, J. Kotula⁸, D. Kozhevnikov⁶, V. Kruchonok⁶, B. Krupa⁷, Sz. Kulis⁸, W. Lange⁴, J. Leonard⁴, T. Lesiak⁷, A. Levy^{1,a}, I. Levy¹, W. Lohmann^{4,b}, S. Lukic⁵, J. Moron⁹, A. Moszczyński⁷, A. T. Neagu¹⁰, F.-X. Nuiy⁸, M. Pandurovic⁵, B. Pawlik⁷, T. Preda¹⁰, O. Rosenblatt¹, A. Sailer⁸, B. Schumm¹², S. Schuwalow^{4,e}, I. Smiljanic⁵, P. Smolyanskiy⁶, K. Swientek⁹, P. Terlecki⁹, U. I. Uggerhoj¹³, T. N. Wistisen¹³, T. Wojton⁷, H. Yamamoto¹¹, L. Zawiejski⁷, I. S. Zgura¹⁰, A. Zhemchugov⁶

FCAL specific issues

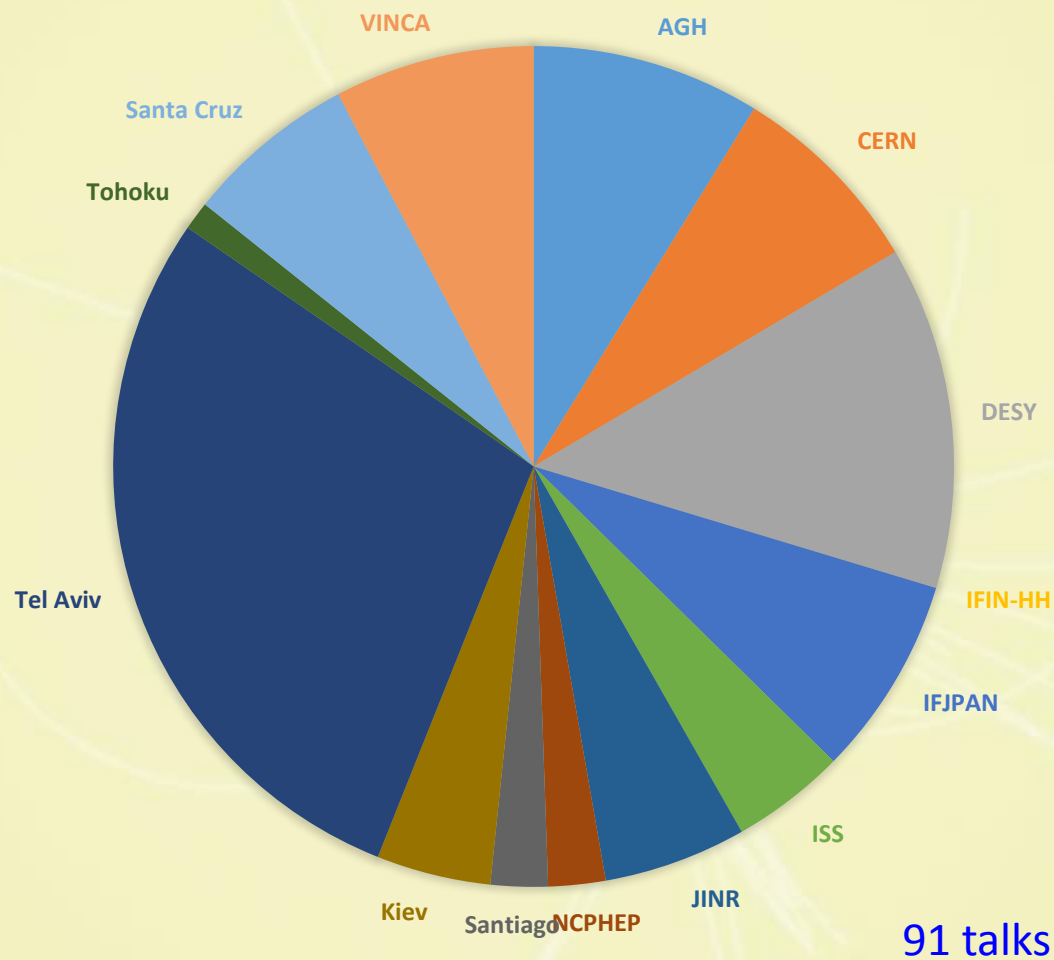
FCAL AUTHORS



67 authors

FCAL specific issues

TALKS IN THE LAST FOUR WS



FCAL funding

- Europe
 - National funding Agencies
 - AIDA 2020 (2020)
 - current JINR-BMBF program ends 2017, new application written, pending
- Chile
 - Angel got a grant
- US ???
- Japan ???

Particularly difficult in some eastern Europe institutions
Effort needed!!!!

Tribute to Leszek



May 10, 2018

Cracow_2018

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