

# 8th meeting of the WG Radio Monte CarLow

H. Czyz/G. Venanzoni



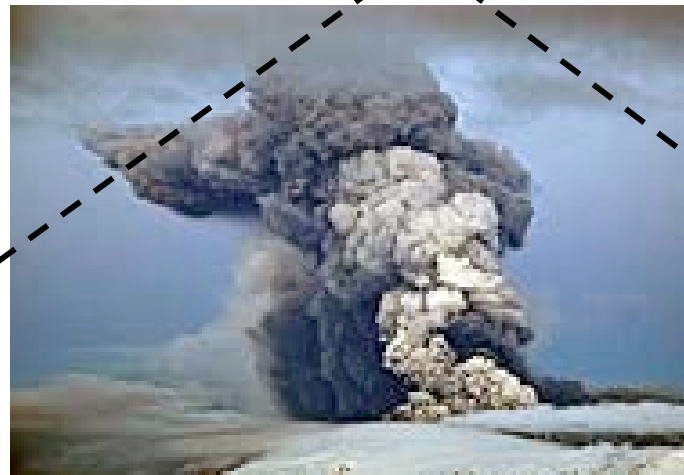
Liverpool 18-19 September 2010



Financial support of the meeting from IPPP Durham is gratefully acknowledged

# 7th meeting of the WG Radio Monte Carlo

“The volcano clouds”



20-21

LNF/INFN Frascati 19-20 Apr 10

# Agenda: Today

## Introduction (09:30-10:00)

- Convener: Venanzoni, Graziano; Czyz, Henryk

## Monte Carlo for R Measurements with energy scan (10:00-11:00)

time	[id] title	presenter
10:00	[1] DAFNE high energy program and the need for MC generators above 1 GeV	VENANZONI, Graziano
10:30	[3] MC generators for multihadronic final states using experience of CMD-2/3, SND and BABAR	EIDELMAN, Simon

## MC for R Measurements using ISR (11:30-12:30)

time	[id] title	presenter
11:30	[2] A few non-expert questions on the accuracy of the hadronic mass spectra provided by MC generators	SHWARTS, Boris
12:00	[4] PHOKHARA 7.0 Monte Carlo generator	CZYZ, Henryk

## Luminosity (15:00-16:00)

time	[id] title	presenter
15:00	[5] Status of Luminosity programs	MONTAGNA, Guido
15:30	[6] Radiative events in BABAYAGA@NLO as a tool for dark matter searches at flavour factories	BALOSSINI, Giovanni

## Tau (16:30-17:30)

time	[id] title	presenter
16:30	[7] Methods for precision, acceptance dependent fits of hadronic currents in tau decays	WAS, Zbigniew
17:00	[8] Radiative one-meson and eta pi pi tau decays and prospects in related theoretical computations	ROIG, Pablo

## Discussion (17:30-18:00)

# Agenda: Tomorrow

## Sunday 19 September 2010

### FSR and Gamma Gamma physics (09:30-11:00)

time	[id] title	presenter
09:30	[9] Final State Radiation in Chiral Effective Theory	GORDINI, Sandro
10:00	[10] $\gamma^*\text{-}\gamma^*$ physics with EKHARA MC generator	CZYZ, Henryk
10:30	[11] Gamma Gamma physics at KLOE-2	MORICCIANI, Dario

### VP (11:30-12:00)

time	[id] title	presenter
11:30	[12] Status and comparison of VP compilations	Dr. TEUBNER, Thomas

### Discussion and election of conveners for FSR and Gamma Gamma physics (12:00-13:00)

# An important news:

The paper "Quest for precision in hadronic cross sections at low energy: Monte Carlo tools vs. experimental data" has been published on the **Eur. Phys. J. C. Volume 66, Issue 3 (2010), Page 585**

Thanks again to all authors!!!

*Remember to quote the paper*

The European Physical Journal

volume 66 · numbers 3–4 · april · 2010

# EPJ C

Recognized by European Physical Society

Particles and Fields

0970707-010

Measurements of  $R$ , the ratio of cross sections of hadronic to muonic final states in  $e^+e^-$  annihilation, in the energy range just above the open charm threshold.  
From S. Actis et al.: Quest for precision in hadronic cross sections at low energy: Monte Carlo tools vs. experimental data

Società Italiana di Fisica

Springer

# Another news:

Stefan has left for Groningen...  
He was very important for the  
development of our WG activity

Let's hope he could still remain  
in this field...

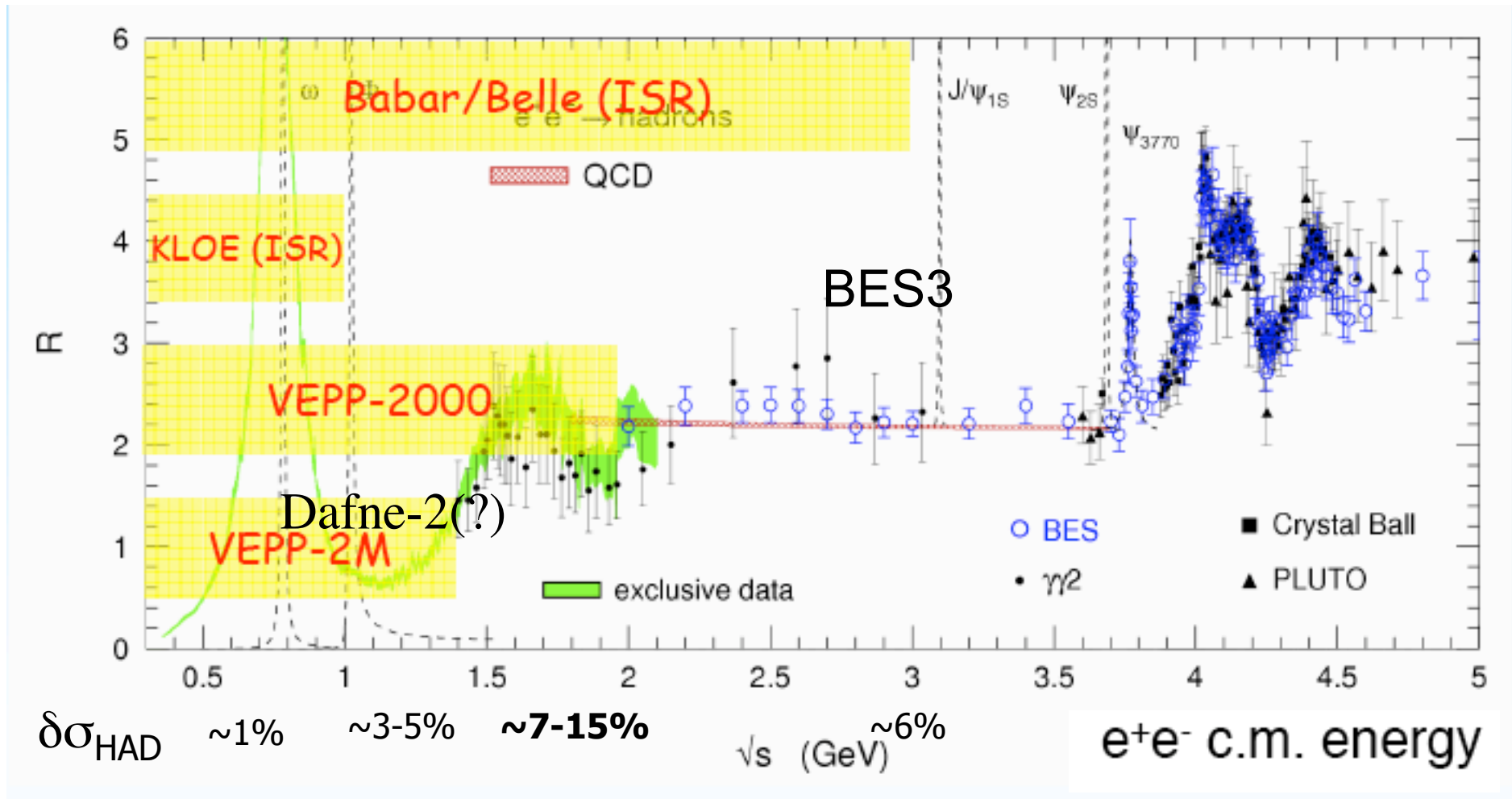


## Experimental activities at low energy:

- VEPP-2M will start soon data taking
- BES3 has already collected a lot of data
- KLOE2 will start soon data taking
- KLOE/Belle/Babar will continue to improve  $\sigma_{\text{HAD}}$  measurement

Precision measurement of  $\sigma_{\text{HAD}}$  at low energy will continue in the next years.  
MC tools very important!

Ultimate goal of  $\sigma_{\text{HAD}}$ : 1% up to  $J/\psi$  ( $\Psi(4s)$ ?)



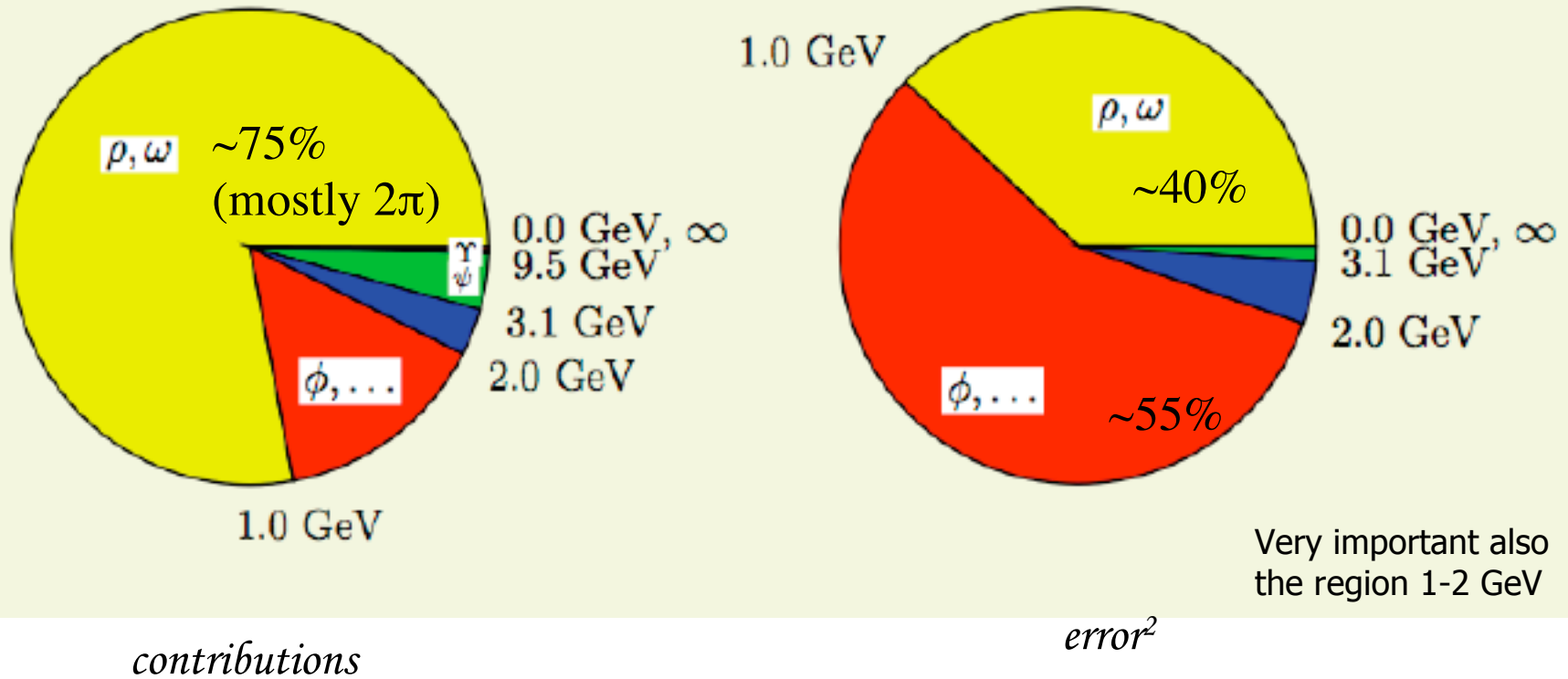
Which is the situation on MC above 1 GeV?

(see S. Eidelman presentation)



# Contribution of different energy regions to the dispersion integral and the error to $a_\mu^{\text{had}}$

F. Jegerlehner, Talk at PHIPSI08



Experimental errors on  $\sigma^{\text{had}}$  translate into theoretical uncertainty of  $a_\mu^{\text{had}}$ !  
 → Needs precision measurements!

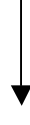
## A rough estimate for g-2

$$a_{\mu}^{\text{exp}} - a_{\mu}^{\text{theo,SM}} = (27.7 \pm 8.4)10^{-10} \quad (3.3\sigma) \quad [\text{Eidelman, TAU08}]$$

$$8.4 = \sim 5_{\text{HLO}} \oplus \sim 3_{\text{LbL}} \oplus 6_{\text{BNL}}$$



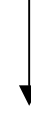
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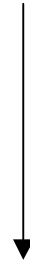
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1.6<sub>NEW G-2</sub>



7-8 $\sigma$  (if 27.7 will remain the same))

$$\delta a_{\mu}^{\text{HLO}} = 5.29 = 3.0 (\sqrt{s} < 1 \text{ GeV}) \oplus 3.9 (1 < \sqrt{s} < 2 \text{ GeV}) \quad \text{FJ08}$$

$$\delta a_{\mu}^{\text{HLO}} \rightarrow 3 = 2.5 (\sqrt{s} < 1 \text{ GeV}) \oplus 1.5 (\sqrt{s} < 1 \text{ GeV})$$

This means:

$$\delta \sigma_{\text{HAD}} \sim 0.4\% \quad \sqrt{s} < 1 \text{ GeV} \quad (\text{instead of } 0.7\% \text{ as now})$$

$$\delta \sigma_{\text{HAD}} \sim 2\% \quad 1 < \sqrt{s} < 2 \text{ GeV} \quad (\text{instead of } 6\% \text{ as now})$$

Precise measurement of  $\sigma_{\text{HAD}}$  at low energies very important also for  $\alpha_{\text{em}}$  !!!

# How to reach $<1\%$ on $\sigma_{\text{HAD}}$ ?

- Improve experimental accuracy
  - Systematic errors under control?
- Improve theory:
  - RC?
  - Modelling of hadron-photon interaction?
- Tuning comparison of MC generator very important:
  - For luminosity this was done;
  - For ISR and scan still the situation is unsatisfactory, and we should try to improve it.

# LbL contribution can be a limiting factor for the calculation of $a_\mu$

- As today  $\delta a_\mu^{\text{LBL}} = [2.5-4]10^{-10}$
- $\delta a_\mu^{\text{BNL}} = 610^{-10} \rightarrow 1.5 \cdot 10^{-10}$
- How to improve?  $\gamma\gamma$  physics can help?
- $\gamma\gamma$  physics is done at Bfactories. It will also be done at KLOE-2 with dedicated detectors, in a region where data are scarce. What about BES?
- Since the subject is growing of attention we propose to cover it in our WG, under the title:  
**“Modelling of photon hadron interaction”:**
  - TFF (from  $\gamma\gamma$  physics)
  - FSR (from 1g exchange)*We need two conveners for this subject*
- Depending on the manpower we can also split it into two separate subgroups

# Structure of the WG

- Luminosity (G. Montagna, F. Nguyen)
- R scan (A. Arbuzov, G. Fedotovitch)
- ISR (H. Czyz, S. Mueller)
- Tau (Z. Was, S. Eidelman)
- VP (T. Teubner, D. Nomura)
- Modelling of photon hadron interaction (...)

Maybe one should replace Stefan...

Tau should also increase their “critical mass”. Can Zbigniew, Simon, Pablo push in this direction (maybe involving also other people)?

# Should we need also a subgroup on g-2?

- With Henryk we were thinking that it would be very useful to have a better understanding of the set of data which are used for g-2 evaluation in a clear way. In fact it's not always clear how these data must be used (and treated)
- In this case we could have an additional subgroup on "g-2"...
- The natural conveners for this would be Simon and Thomas (if they/we agree on this), but we can also include someone else...

Let's discuss it....

How to improve the critical mass:  
can we access to European funds  
(especially for positions)?

Any idea/suggestion ?

- Thanks very much Thomas for the organization and the University of Liverpool and IPPP Durham for the support
- Next meeting most likely in Frascati on April 2011. Any preference for the date?

Have a nice meeting!!!!