

15th meeting of the WG Radio Monte CarLow

H. Czyz/G. Venanzoni



Mainz 11 April 2014

Agenda

Introduction (10:00-10:20)

- Presenters: VENANZONI, Graziano

Radiative Correction and MC I (10:20-11:00)

time	[id] title	presenter
10:20	[21] The electronic width of the X(3872)	RIPKA, Martin
10:40	[22] Production of 1++ meson in a e+e- machine	LIU, Zhiqing

Coffee Break (11:00-11:30)

Radiative Corrections and MC II (11:30-12:30)

time	[id] title	presenter
11:30	[23] MC generator comparison of Babayaga@NLO, Babayaga.3.5, and BHWIDE	HAFNER, Andreas
11:50	[24] Towards a Precision Measurement of the Muon Pair Asymmetry in e+e- Annihilation at Belle and Belle 2	FERBER, Torben
12:10	[20] Monte Carlo Generators for the study of e+e- -> 2(pi+pi-pi0) process with CMD-3 detector	LUKIN, Peter

Lunch (12:30-14:00)

Agenda

Radiative Corrections and MC III (14:00-15:30)

time	[id] title	presenter
14:00	[25] Update on the combined estimate of KLOE ISR measurements	MUELLER, Stefan
14:20	[26] Precision tests of unitarity in leptonic mixing	VAN DER BIJ, Jochum
14:40	[27] Gradient method with re-weighted events and its implementation in Tauolo to fit the three pion mode	ZAREMBA, Jakub

Coffee Break (15:30-16:00)

Discussion on HPrecisionNet (16:00-17:30)

- Conveners: Kupsc, Andrzej

An important news from the last meeting is the application to H2020 within the networking program **HPH**. Our Work package is **HPrecisionNet**

Many thanks to Andrzej who coordinated all these efforts

In the afternoon we will have a dicussion on that

HadronPhysicsHorizon (HPH)

A. WORK PACKAGE DESCRIPTION

(maximum length: 4 pages)

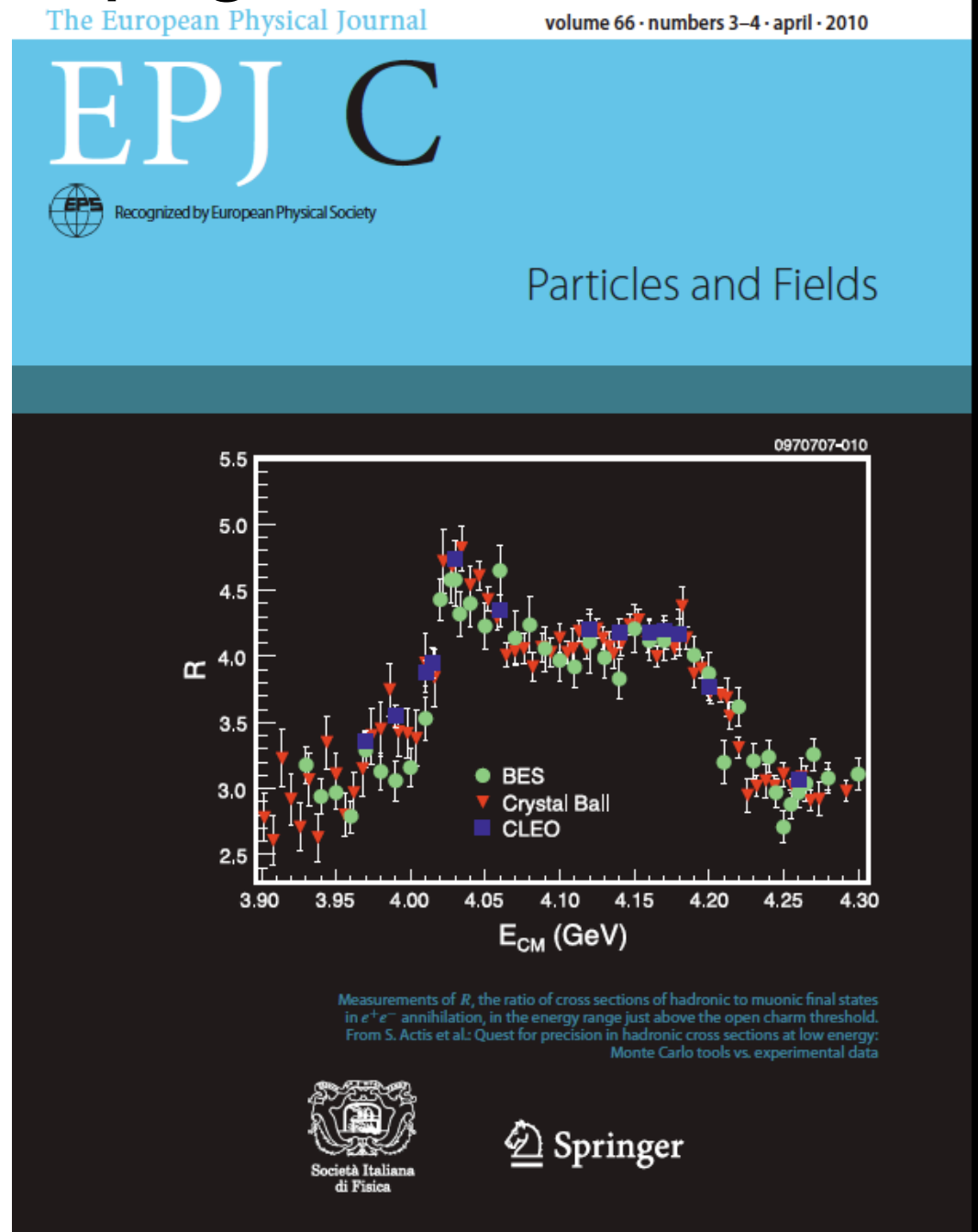
Work package number	WP26	Start date	2015-01-01
Activity Type	COORD		
Activity number and acronym	HPrecisionNet		
Work package title	Precision Hadron Physics: From Intrinsic Structure to Physics Beyond the Standard Model		

Usual propaganda:

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



How to reach $<1\%$ on σ_{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.
 - FSR modelling should be improved

HLbL contribution can be a limiting factor for the calculation of a_μ

- 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/will be done at (Super)Bfactory, KLOE-2 and BESIII with dedicated detectors, in a region where data are scarce
- Also $e^+e^- \rightarrow PS\gamma$
- A systematic study which uses data is proposed in **arXiv:1402.7081** (G. Colangelo et al.)

These weeks 2 important workshops in Mainz

- “Hadronic contributions to the muon anomalous magnetic moment: strategies for improvements of the accuracy of the theoretical prediction”, Mainz, 1-5 April 2014:

<https://indico.mitp.uni-mainz.de/conferenceDisplay.py?ovw=True&confId=13>

- “(g-2)mu: Quo vadis?”, Mainz, 7-10 April 2014:

<https://indico.cern.ch/event/284012/overview>

Outcomes/results/challenges?

- **Dinner this evening:**
 - It will be in the Bar/Restaurant "Heilig Geist" downtown at 7:30 pm: <http://www.heiliggeist-mainz.de/>
 - It is located in Mailandsgasse 11 behind the Gutenberg Museum in closest vicinity to the cathedral (Dom) and the Rhine river.
 - Cost ~ per person
- **Data and place for next meeting:**
 - Aachen, Germany as satellite of Tau14 (15-19 September 2014)
 - Frascati, Italy as satellite of Mesonnet Workshop (xx September 2014)
 - Other places?

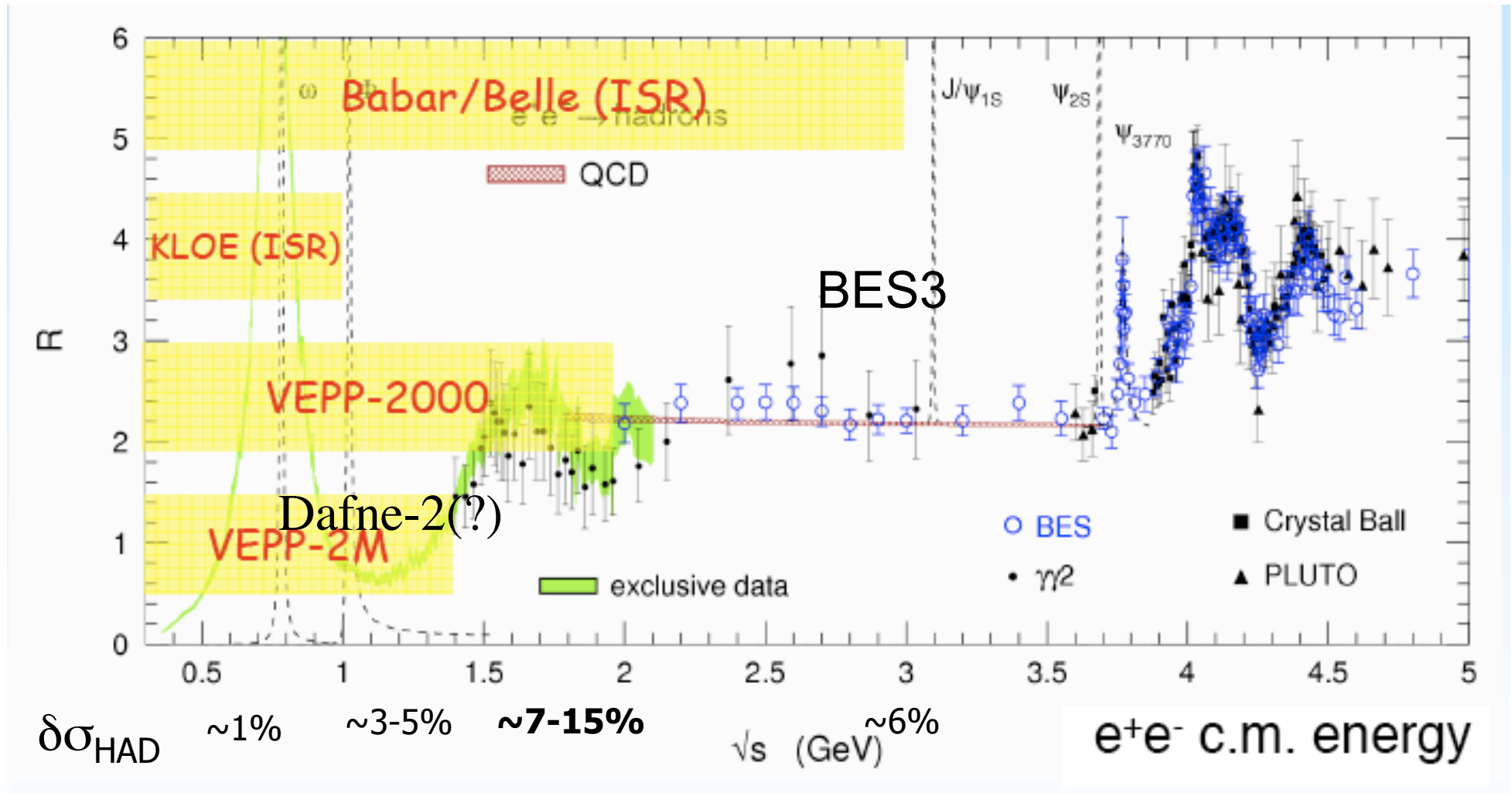
Have a nice meeting!!!!

spare

Structure of the WG

- Luminosity (G. Montagna, F. Nguyen)
- R scan (A. Arbuzov, G. Fedotovitch)
- ISR (H. Czyz, G. Venanzoni)
- Tau (Z. Was, D. Epifanov)
- Hadronic VP, g-2 and Δa_{em} (T. Teubner, S. Eidelman)
- gamma-gamma physics (S. Ivashin, D. Moricciati)
- FSR models (S. Gorini, A. Denig)

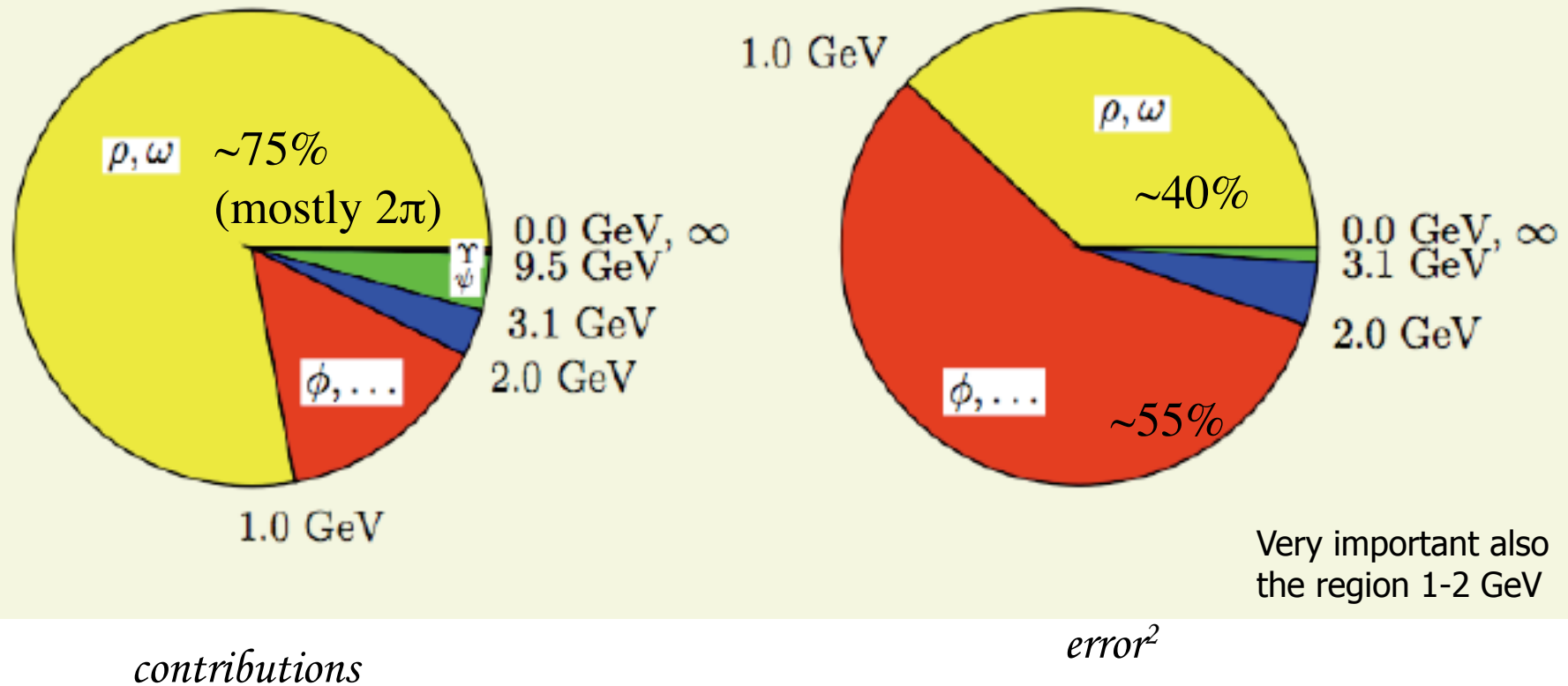
Ultimate goal of σ_{HAD} : 1% up to J/ψ ($\Psi(4s)$?)



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_μ^{had}

F. Jegerlehner, Talk at PHIPSI08



Experimental errors on σ^{had} translate into theoretical uncertainty of a_μ^{had} !
 → Needs precision measurements!

A rough estimate for g-2

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

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



4



3



3



1.6_{NEW G-2}



7-8 σ (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 σ_{HAD} at low energies very important also for α_{em} !!!