16th meeting of the WG Radio Monte CarLow

H. Czyz/G. Venanzoni

Frascati 18-19 November 2014

Agenda

Tuesday 18 November 2014

Introduction - (09:40-10:00)

- **Presenters: VENANZONI, Graziano; Prof. CZYZ, Henryk**

Hadronic cross section and MC generators I - (10:00-11:00)

time	[id] title	presenter
10:00	[1] Present accuracy and future prospects of MC generators for Bhabha and e+e- to gamma-gamma	CARLONI CALAME, Carlo Michel
10:30	[3] Current status of luminosity measurement with CMD-3 detector at the VEPP-2000 e+e- collider	Dr. FEDOTOVICH, Gennadi

Hadronic VP, g-2 and Delta alpha I - (11:00-11:30)

time	[id] title	presenter
11:00	[4] The role of experimental data as input information for precise hadronic calculations: muon g-2, rare pi0 decays and mixing parameters	Dr. MASUJAN, Pere

Hadronic VP, g-2 and Delta alpha II - (12:00-13:00)

time	[id] title	presenter
12:00	[5] Positronium contribution to the electron g-2	PASSERA, Massimo
12:30	[6] Towards a data-driven analysis of hadronic light-by-light scattering	HOFERICHTER, Martin

Agenda

Tuesday 18 November 2014

Hadronic cross section and MC generators II - (14:30-16:00)

time	[id] title	presenter
14:30	[7] Primary Monte-Carlo generator of the process e+e- -> a0(980)rho(770) for the CMD-3 experiment	Dr. LUKIN, Peter
15:00	[8] Automation of the leading order calculations for e+e- -> hadrons	Dr. KOLODZIEJ, Karol
15:30	[9] MCGPJ for the processes e+e- \to hadrons for experiments with CMD-3 detector at the VEPP-2000 collider	Dr. FEDOTOVICH, Gennadi

Hadronic cross section and MC generators III - (16:30-17:30)

time	[id] title	presenter
16:30	[10] χ_{c1} and χ_{c2} production at e^+e^- colliders.	Dr. TRACZ, Szymon
17:00	[11] New nucleon form factors in PHOKHARA	CZYZ, Henryk

Tau - (17:30-18:30)

time	[id] title	presenter
17:30	[12] Status of Monte Carlo generator Tauola	SHEKHOVTSOVA, Olga
18:00	[13] Status of HPrecisionNet	Dr. KUPSC, Andrzej

Tomorrow there is nothing on agenda but we can use the morning to continue the discussion (if needed)

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 Andrzej will inform us on the status of the proposal

HadronPhysicsHorizon (HPH)

A. WORK PACKAGE DESCRIPTION
(maximum length: 4 pages)

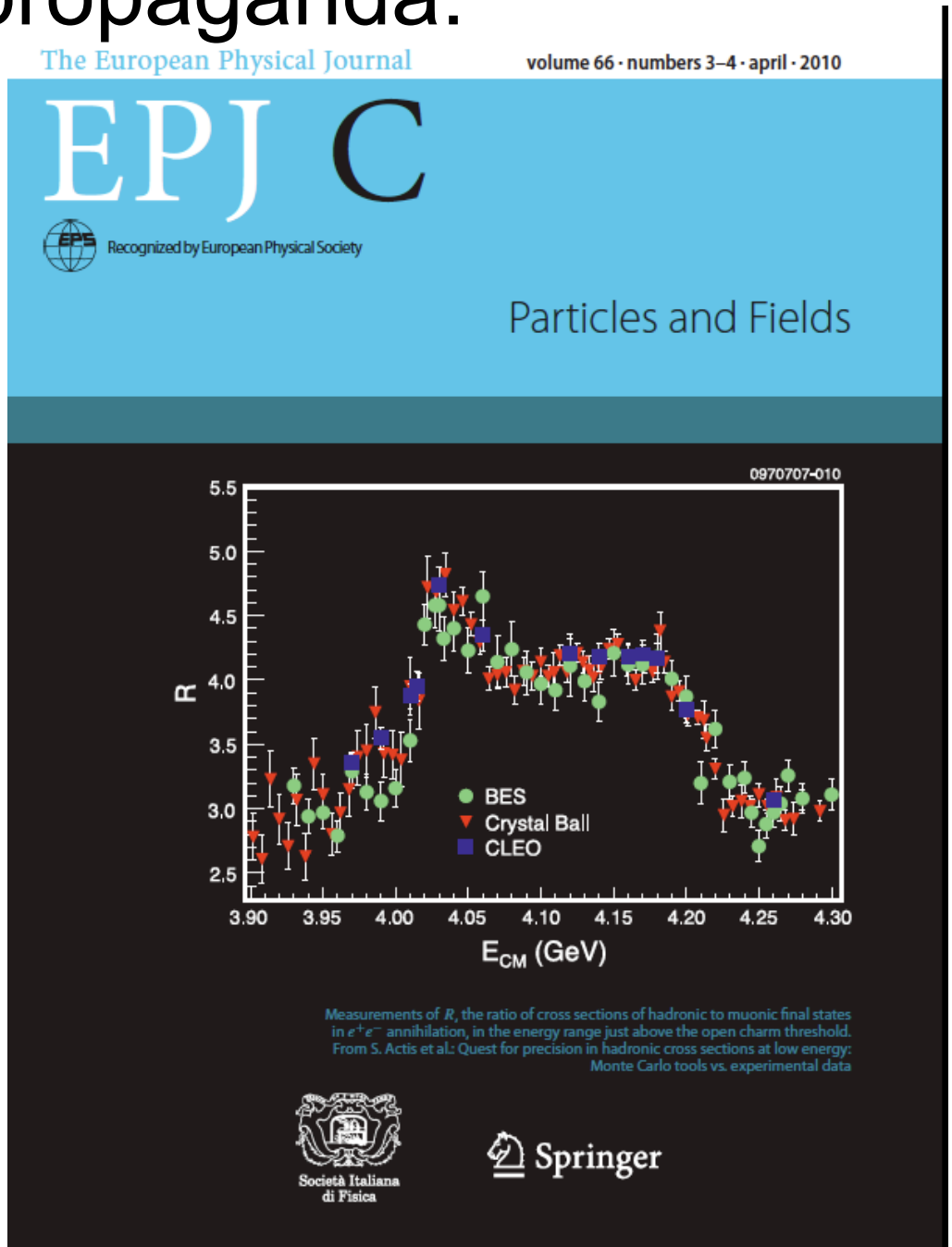
Work package number	WP26	**Start date**	2015-01-01
Activity Type	COORD		
Activity number and acronym	**HPrecisionNet**		
Work package title	Precision Hadron Physics: From Intrinsic Structure to Physics Beyond the Standard Model		

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 $\delta a_\mu^{LbL} = [2.5\text{-}4]10^{-10}$
- $\delta a_\mu^{BNL} = 610^{-10} \rightarrow 1.5\ 10^{-10}$
- How to improve? $\gamma\gamma$ physics can help?
- Yes
- A systematic study which uses data is proposed in **arXiv:1402.7081** (G. Colangelo et al.)
- Today Martin will report on that (via skype)

A very interesting and debated discussion on the contribution of e+e- bound state for a_μ

Massimo will report on that

New data are coming from VEPP2000, BESIII, (Super)Belle. But which is the accuracy on RC and MC corrections?

-Accuracy on gg and lepton channels?
-Accuracy on hadronic channels?

Many talks at the meeting

Meanwhile in Frascati…

Monday, 10 November 2014

10:30 - 10:50	Introduction *20'*
10:50 - 11:20	DAFNE present and future *30'* Speaker: Catia Milardi (LNF) Material: Slides
11:20 - 11:50	Preliminary concept of a low-energy small-size e+e- c scheme *30'* Speaker: Prof. Eugene Levichev (BINP) Material: Slides
11:50 - 12:20	Physics with a High Luminosity e+e- collider *30'* Speaker: Dr. Caterina Bloise (LNF) Material: Slides
12:20 - 12:45	Low-energy QCD with strange quarks: from antikaon- neutron stars *25'* Speaker: Wolfram Weise (ECT Trento and TUM Muenchen) Material: Slides
12:45 - 13:10	Unresolved issues in Strangeness Nuclear Physics *25'* Speaker: Prof. Avraham Gal (Hebrew University, Jerusalem)
13:10 - 13:30	Strangeness Nuclear Physics at DAFNE - Status and Fu Speaker: Dr. Catalina Oana Curceanu (LNF) Material: Slides
13:30 - 14:30	Lunch Break (LNF Canteen)
14:30 - 14:50	Low-energy kaon-nucleon/nuclei interactions studies a Speaker: Dr. Johann Zmeskal (Stefan Meyer Institute for Subato Material: Slides
14:50 - 15:10	High-resolution hadronic atom X-ray spectroscopy witl Speaker: Dr. Shinji Okada (RIKEN) Material: Slides
15:10 - 15:35	DAFNE as test facility for future projects *25'* Speaker: FRANK ZIMMERMANN (CERN) Material: Slides
15:35 - 15:55	Discussion on DAFNE Physics *20'*
15:55 - 16:25	Coffee break
16:25 - 17:00	What next with Sparc-Lab *35'* Speaker: Massimo Ferrario (LNF) Material: Slides
17:00 - 17:35	The DAFNE BTF *35'*

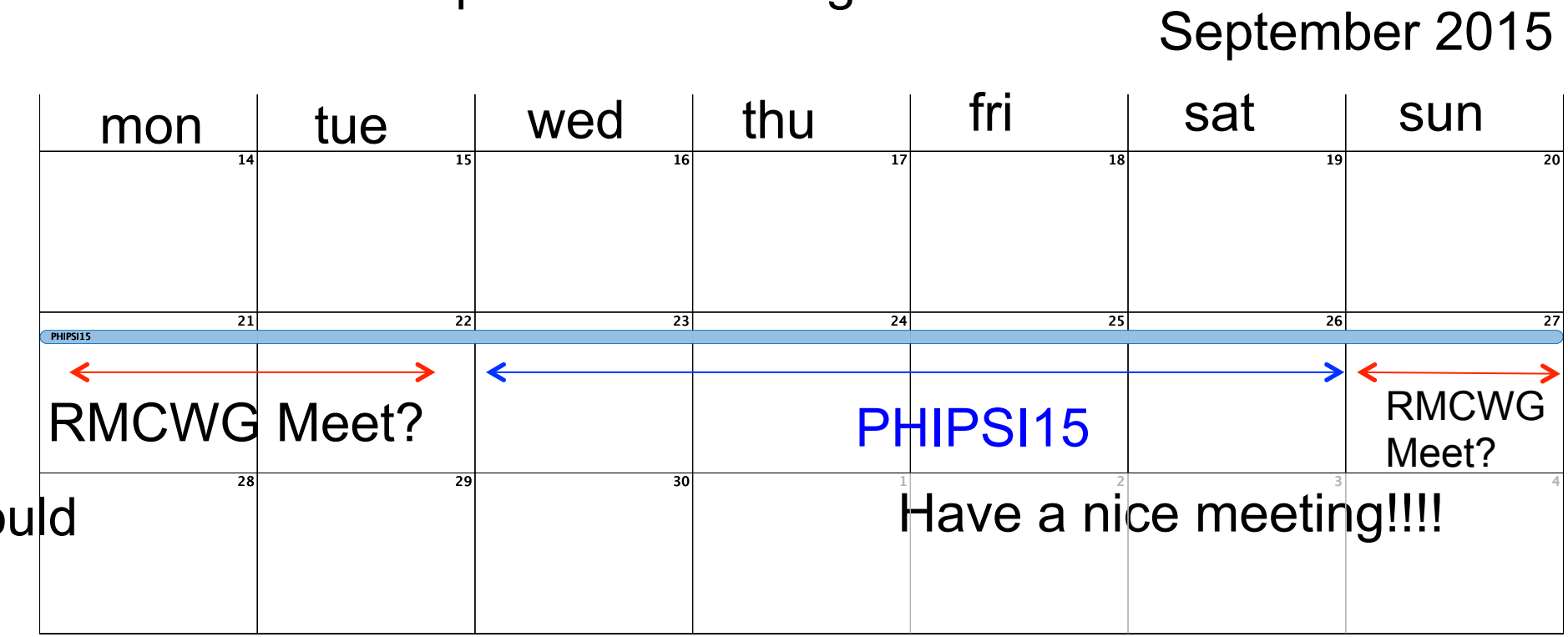
https://agenda.infn.it/conferenceOtherViews.py?view=standardshort&confId=8563

Many talks…I'm not sure what the "future" will be…

- **Dinner this evening:**
  - It will be at the Restaurant ”Zaraza’’" at 8:15 pm:
  - It is in viale Regina Margherita 45 00044 Frascati
  - It is 300mt close to Piazza del Mercato
  - It will be offered by our Director (thanks!)

We can meet at 7:50pm in “Piazza San Pietro” (in front of the cathedral)

- **Data and place for next meeting?**
  - We would like to keep the tradition of one meeting at Frascati and one abroad. Since the fall meeting will be in Hefei, China, on September as satellite of PHIPSI15 Conf (23-26/09/15), the April meeting will be most likely in Frascati
  - When: What about 13-14 April (Mon-Tue)?
  - When the September meeting:

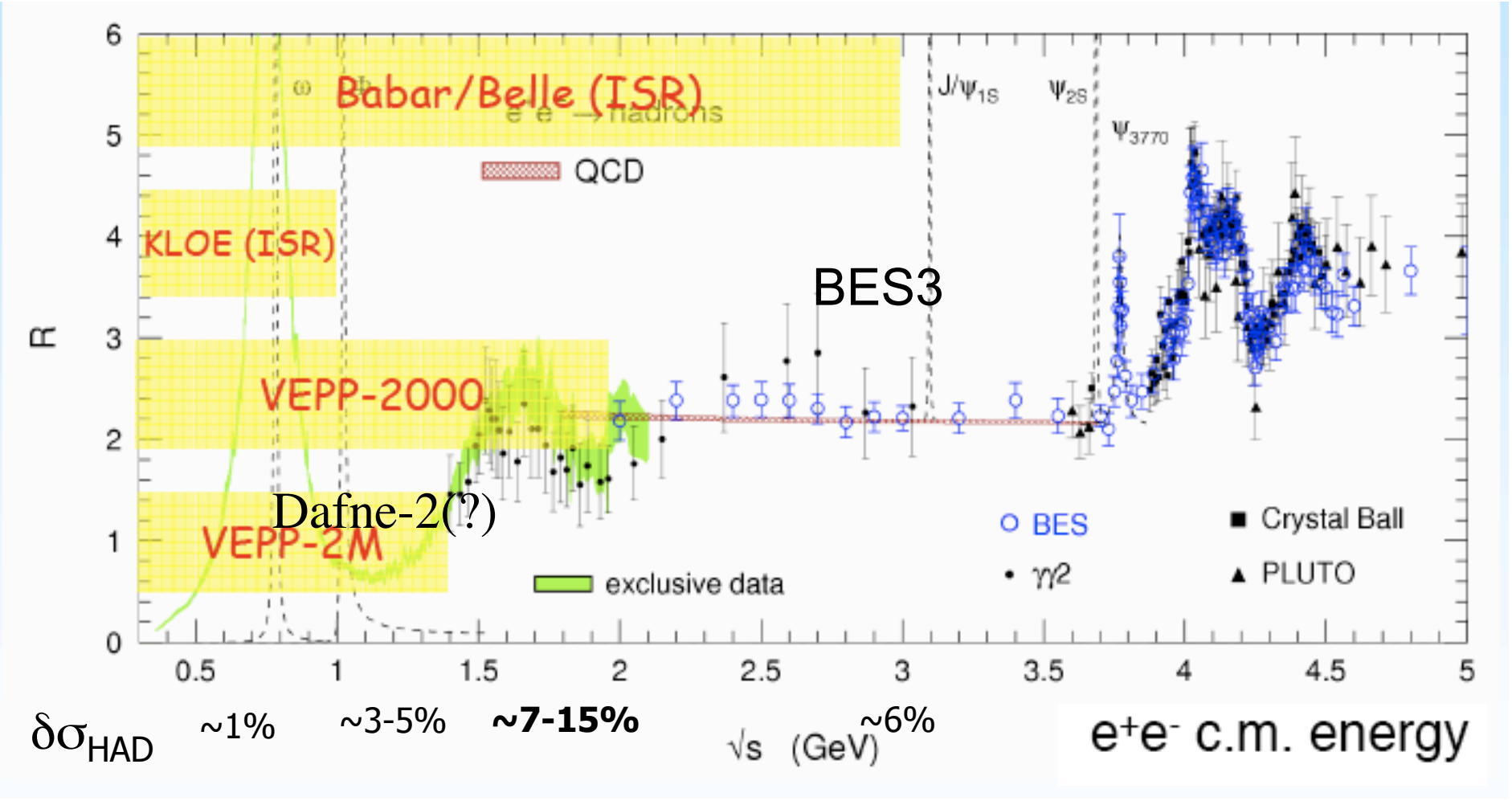


spare

Structure of the WG

- **Luminosity (G. Montagna, F. Nguyen)**
- **R scan (A. Arbuzov, G. Fedotovich)**
- **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. Moricciani)**
- **FSR models (S. Gorini, A. Denig)**

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

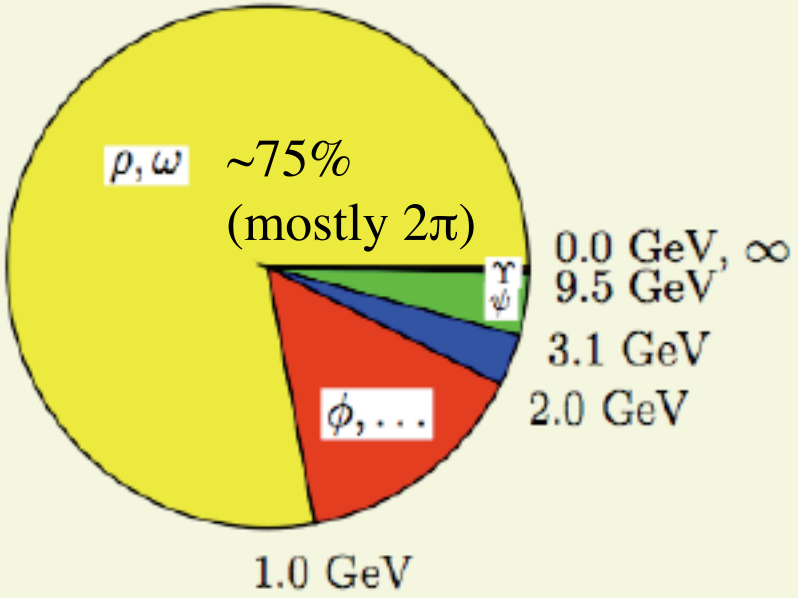


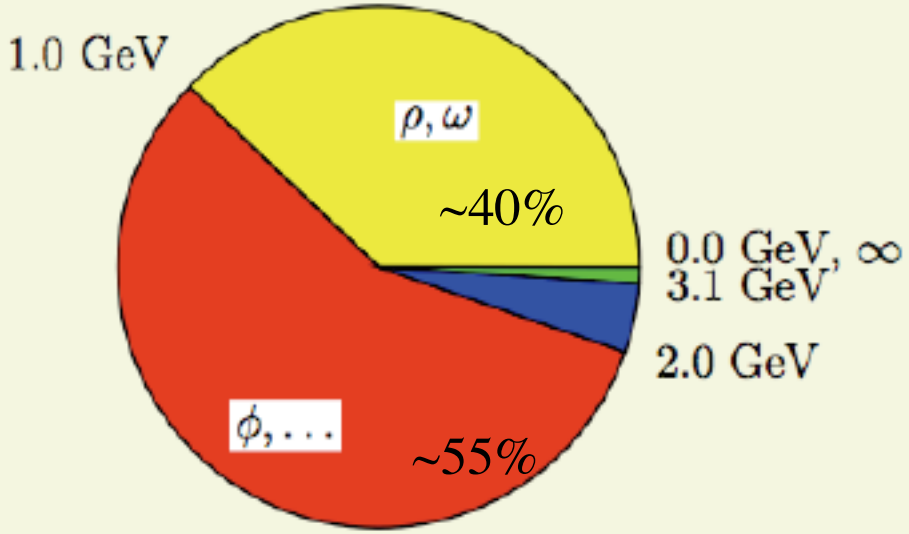
Which is the situation on MC above 1 GeV?

(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





Very important also the region 1-2 GeV

contributions *error²*

Experimental errors on σ^{had} translate into theoretical uncertainty of a_μ^{had}!

→ Needs precision measurements!

A rough estimate for g-2

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

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

4 3 3 1.6 NEW G-2 $7\text{-}8\sigma$ (if 27.7 will remain the same))

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

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

This means:

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

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

Precise measurement of σ_{HAD} at low energies very important also for α_{em} !!!