

# Gauge bosons (W/Z) in PDG-RPP

A report to the  
PDG Collaboration,  
CERN, 10 October 2008

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(\* Deceased)

(Encoders/Overseers)

# Carlo Caso

- **CC+AG: W/Z responsibility since 1992**  
(Except 1994-96 when only the Z was covered)  
Carlo passed away mid-2007 after battling cancer for a number of years.
- **I personally knew him since 1984 on the LEBC (charm) experiment at CERN.**
- **He was an excellent physicist and very meticulous, as needed in PDG!**
- **Very mature, fully understanding the collaborative spirit and yet able to make a point without offending anyone.**
- **As all PDG collaborators will testify, he was also a wonderful human being, very warm, humorous, full of life.**
- **We remember him and pay tribute to him.**

# Introducing Martin Grünewald

- **Ph.D. on L3, LEP**
- **CERN Post-Doc Fellow**
- **Prof at Dublin**
- **University of Ghent**
  
- **Excellent training and expertise in electroweak physics**
- **Convener of LEPEWWG, member of TEVEWWG**
- **Very suited to the W/Z sections of PDG**

# Evolution of statistics

- **Papers read:**

<b>1992</b>	<b>94</b>	<b>96</b>	<b>98</b>	<b>2000</b>	<b>02</b>	<b>04</b>	<b>06</b>	<b>08</b>
<b>?</b>	<b>80</b>	<b>86</b>	<b>93</b>	<b>98</b>	<b>83</b>	<b>31</b>	<b>49</b>	<b>44</b>

- **Nodes (Particle properties):**

	<b>1992</b>	<b>94</b>	<b>96</b>	<b>98</b>	<b>2000</b>	<b>02</b>	<b>04</b>	<b>06</b>	<b>08</b>
<b>Z</b>	<b>47</b>	<b>75</b>	<b>107</b>	<b>128</b>	<b>134</b>	<b>134</b>	<b>140</b>	<b>145</b>	<b>148</b>
<b>W</b>		<b>14</b>	<b>14</b>	<b>15</b>	<b>28</b>	<b>30</b>	<b>30</b>	<b>34</b>	<b>34</b>

- **Pages in RPP**

	<b>1992</b>	<b>94</b>	<b>96</b>	<b>98</b>	<b>2000</b>	<b>02</b>	<b>04</b>	<b>06</b>	<b>08</b>
<b>Z</b>	<b>7</b>	<b>13</b>	<b>15</b>	<b>18</b>	<b>18</b>	<b>20</b>	<b>21</b>	<b>22</b>	<b>21</b>
<b>W</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>5</b>	<b>7</b>	<b>7</b>	<b>7</b>	<b>7</b>	<b>7</b>

# Brief recapitulation

- **1992-2002: period of intense activity in W/Z, with LEP (ADLO), SLC (SLD), TEVATRON Run-I (CDF,D0) producing a torrent of data and publications.**
  - **The number of NODES and PAGES in RPP increased by a factor of 3.**
  - **LEP: To obtain best LEP average measurements, results from the four experiments obtained over several years had to be combined using averaging procedures which accounted for correlated errors.**
- role of LEP working groups (see next slide).**

# Working groups

- **LEP Working groups devised proper averaging procedures to account for correlations**
  - **between experiments (same beams/M.C. models/ theory input to extract measurements)**
  - **between different data runs/ years**
  - **due to use of > 1 measurements within a fit to extract the best value of a quantity**
- **LEP Electroweak Working Group; LEP W-group**  
**Klaus Monig => CC for Z -> b bbar/c cbar**  
**AG for Z-lineshape, W-mass, branching ratios**  
**THIS LEP WG → PDG INTERFACE PLAYED A CRITICAL ROLE OVER THE YEARS.**
- **Now TEVATRON EWWG has taken shape and plays a similar role for RUN-II data on W and Z – Martin Grunewald.**

# Mini-reviews

- **PDG: Providing world averages a crucial task (most quoted reference).**
- **Consequence of complicated averaging procedures: Long mini-reviews as explanations**  
→ **Notes on Z-boson, W-mass.**
- **Mini-reviews also useful to**  
**Clarify terminology, give latest preliminary results on important quantities.**

# Mini-reviews - 2

- **Other mini-reviews:**  
on W-TGC's (gamma WW, ZWW),  
ZZ $\gamma$ , Z $\gamma\gamma$ , ZZV Couplings  
Anomalous W/Z Quartic couplings.
  - All are revised for every hardcopy/WEB edition, and a new one written if necessary.
  - For RPP06, a critical evaluation was carried out of the Z mini. Sent to expert referees, who made a number of suggestions for improvement and for correction (e.g. in references).  
For RPP08 MG suggested some changes and these are incorporated.
- This turned out to be a very worthwhile exercise and we believe the Z mini definitely reads better !

# Status in RPP 2006/08

- **Z: line-shape and lepton forward-backward asymmetry related data finalized in RPP 2002.**
- **LEP1: remaining Z related papers, [Z  $\rightarrow$  heavy flavor (b, c)]  
 $\rightarrow$  For RPP 06, these are now all finalized and published.**

**LEP2: Final papers on W related measurements**

$\rightarrow$  For RPP 06, most are published, but some still remain,

**e.g., Delphi: W mass & width; W-TGC's; Opal: W BR's**

$\rightarrow$  For RPP08: Delphi and Opal results published, but FINAL LEP averaging still to be done. WE HOPE: SOON

- **Tevatron Run II: RPP08 has CDF measurements on W mass & width (the most precise by any one experiment). TGCs also measured.**

# Expectations for W/Z for RPP 2010

- **Remnant LEP averaging will be available.**
- **New results from Tevatron Run II:**  
on many measurements on W, Z, including mass, width, BR's, couplings. **More accurate W mass would make Higgs mass prediction more precise to confront with LHC (or even Tevatron). With delay in LHC startup Tevatron could have a slightly prolonged role to play (modulo funding).**
- **We hope LHC will become operational in 2009 and some results on W/Z make it for RPP 10.**

Thank you.

Carlo Caso, Atul Gurtu, Martin Grünewald:  
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