$g-2$ of μ

BROOKHAVEN

$\delta(\alpha_{EM})$ CONTRIBUTES

4 Times

The projected STATISTICAL ERROR

SM parametrisation

→ α, α_s	QED and QCD couplings
m_Z, m_W, m_H	boson masses
m_f, V_{CKM}	fermion masses and CKM matrix

Constraints from independent measurements:

From muon decay:

$$G_F = \frac{\pi\alpha(0)}{\sqrt{2}} \cdot \frac{m_Z^2}{m_W^2(m_Z^2 - m_W^2)} \cdot \frac{1}{1-\Delta r}$$

$$G_F = (1.16639 \pm 0.00001) \cdot 10^{-5}\,\mathrm{GeV}^{-2}$$

From low energy measurements:

$$\alpha(m_Z^2) = \frac{\alpha(0)}{1-\Delta\alpha(m_Z^2)}$$

$$\Delta\alpha(m_Z^2) = \Delta\alpha_{lep} + \Delta\alpha^5_{had}$$ ←

$$\alpha(m_Z^2)^{-1} = 128.896 \pm 0.090$$

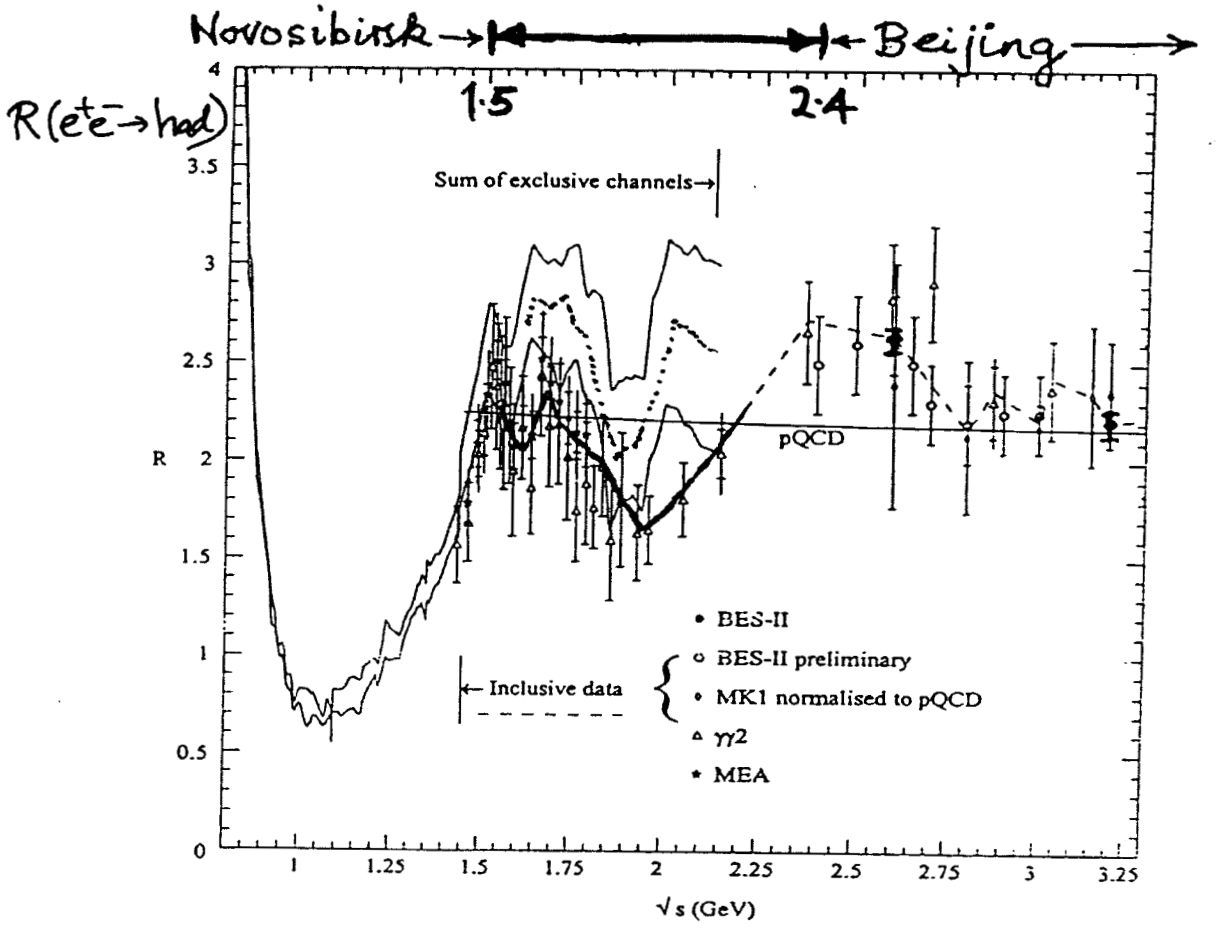
$\Delta\alpha^5_{had}$	$= 0.02804 \pm 0.00065$	Jegherlehner et al.
$\Delta\alpha^5_{had}$	$= 0.02784 \pm 0.00026$	'theory driven'

New results coming from BES:
Hadronic cross sections between
$2\ \mathrm{GeV} \leq \sqrt{s} \leq 5\ \mathrm{GeV}$.

ALAN MARTIN

1b $R(e^+e^- \to \text{hadrons})$ vital input for $\Delta\alpha^{(5)}_{had}$

Need more R data



$\Delta\alpha^{(5)}_{had} = 0.02742 \pm 0.00025$ (inclusive)

$= 0.02770 \pm 0.00029$ (exclusive)

(M, Outhwaite, Ryskin) '99

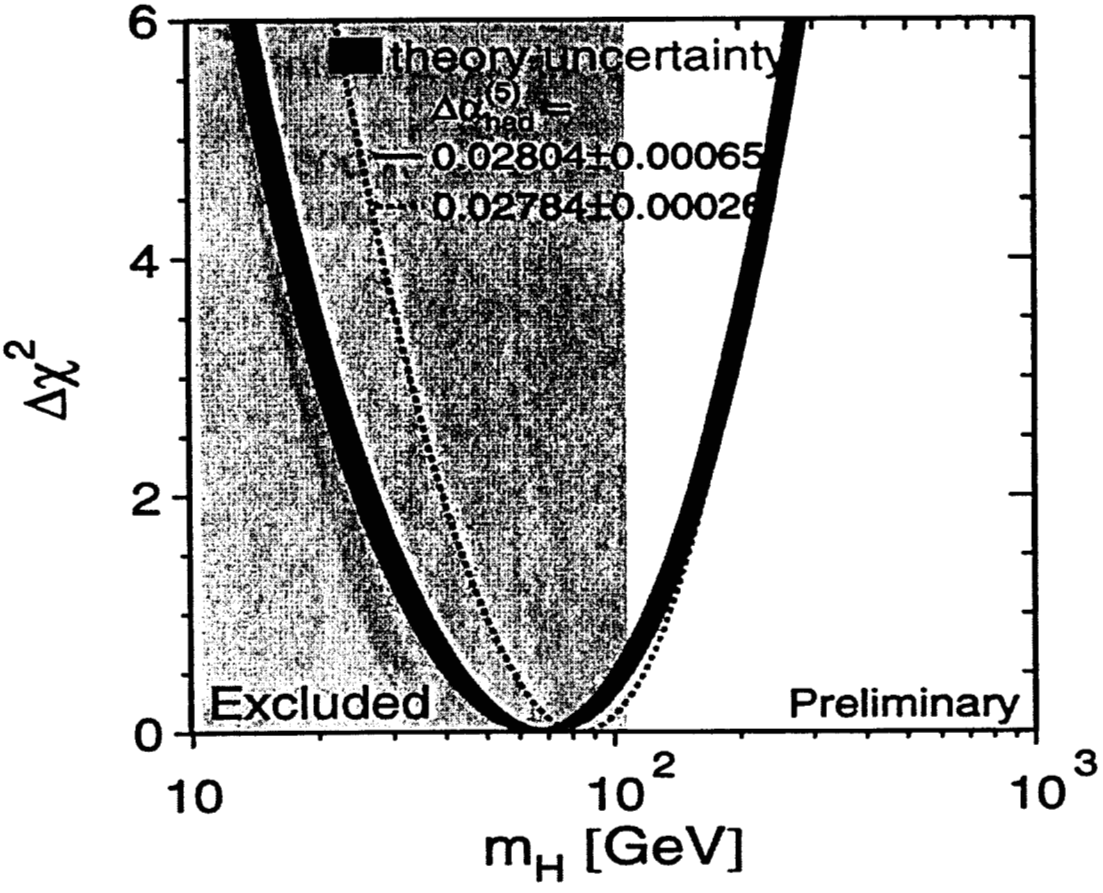
Moves parabola to higher M_H

25

Muijs

NIKHEF

Higgs mass



$$m_H = 66.5\ ^{+60.0}_{-33.4} \qquad \log m_H = 1.82\ ^{+0.28}_{-0.30}$$

From direct searches at LEP II:

$$m_H > 107.7 \text{ GeV at 95 \% C.L.}$$

From SM fits to electroweak data:

$$m_H < 188 \text{ GeV at 95 \% C.L.}$$