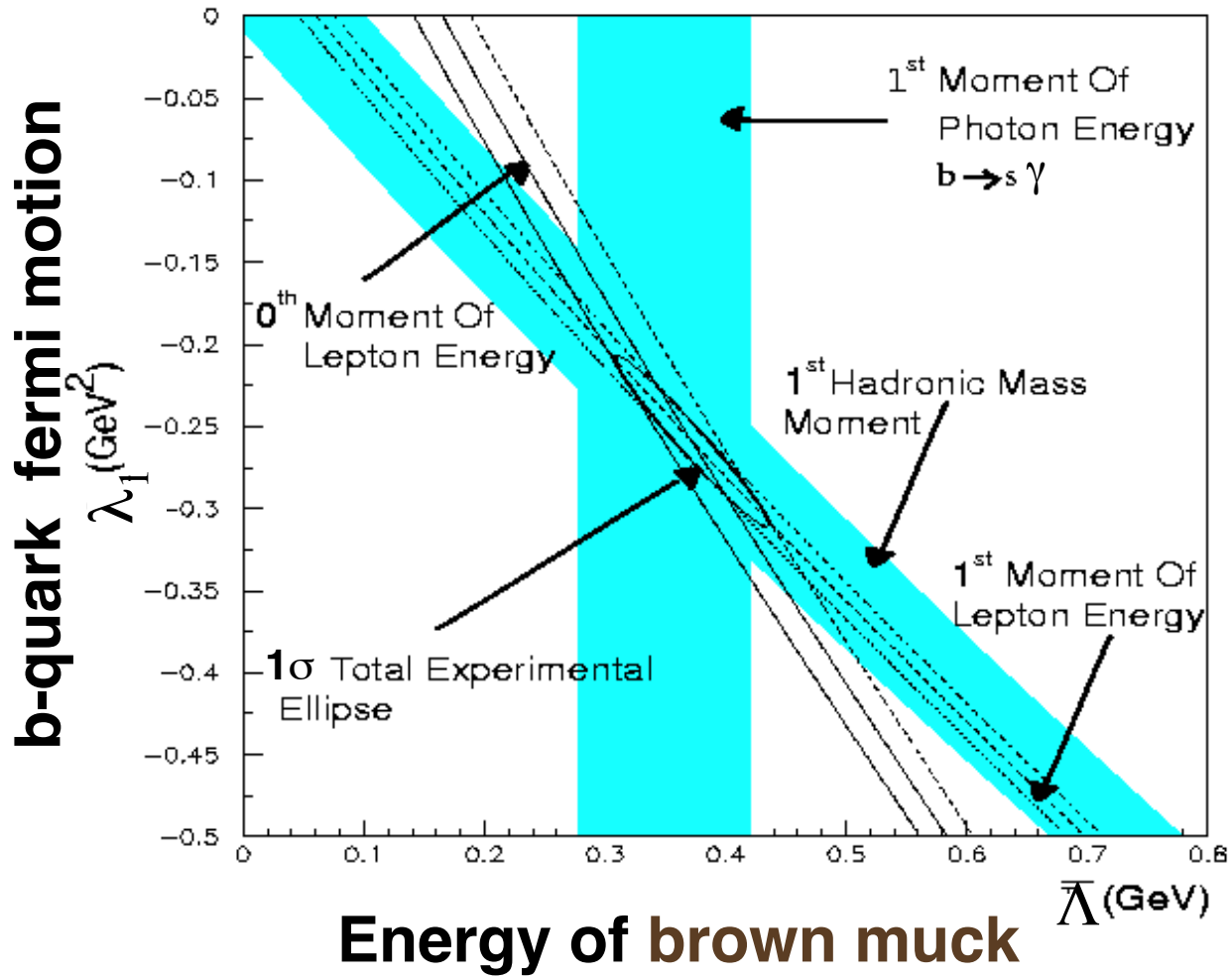
HEPAP

Nov. 7, 2002

THE CORNELL REPORT

- Resonance running (~4.5 fb^{-1})
- More b-physics (still going strong)
- Accelerator R/D (wiggler dominated storage rings for c-physics and Linear Collider damping rings)

Precision CKM: $|V_{cb}|$

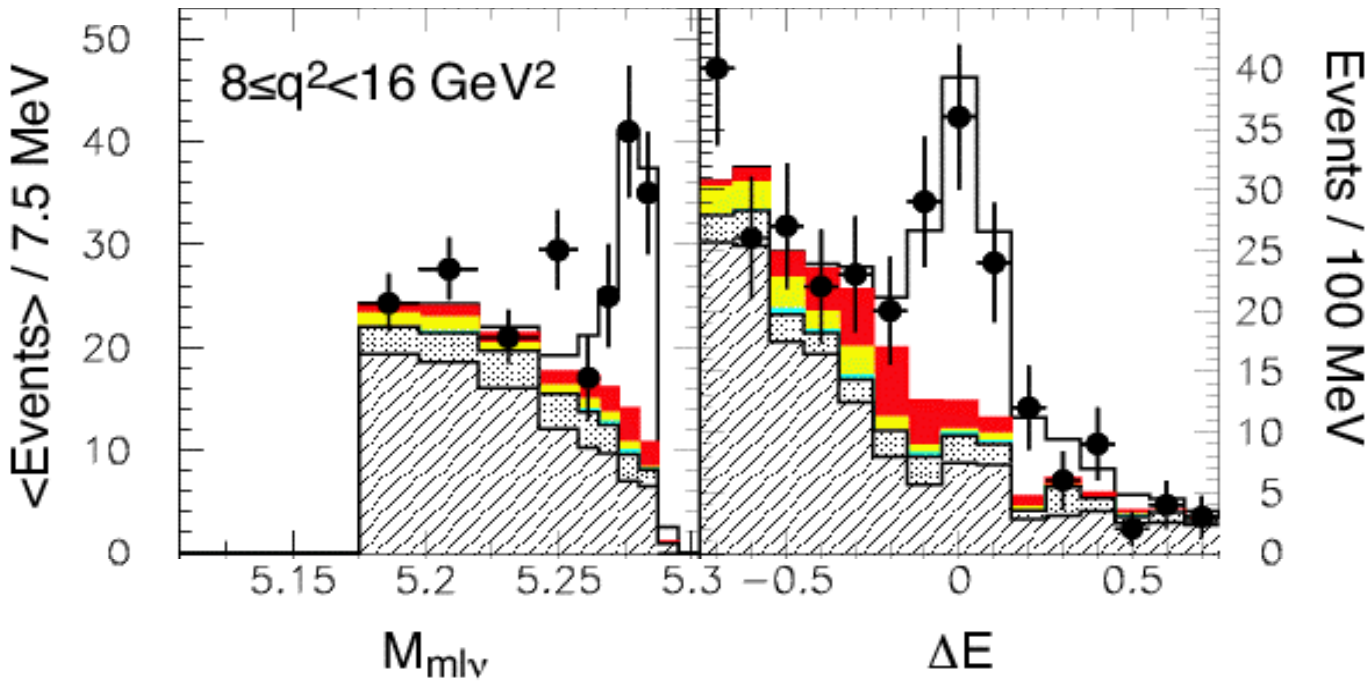


Recent CLEO constraints reduce the theory uncertainty in V_{cb} from inclusive $b \to c l \nu$ by nearly a factor of two.

$$|V_{cb}| = (40.8 \pm 0.5_{\Gamma} \pm 0.4_{\lambda\Lambda} \pm 0.9_{th}) \times 10^{-3}$$

Precision CKM: $|V_{ub}|$

$B \to \pi l \nu$ using neutrino reconstruction

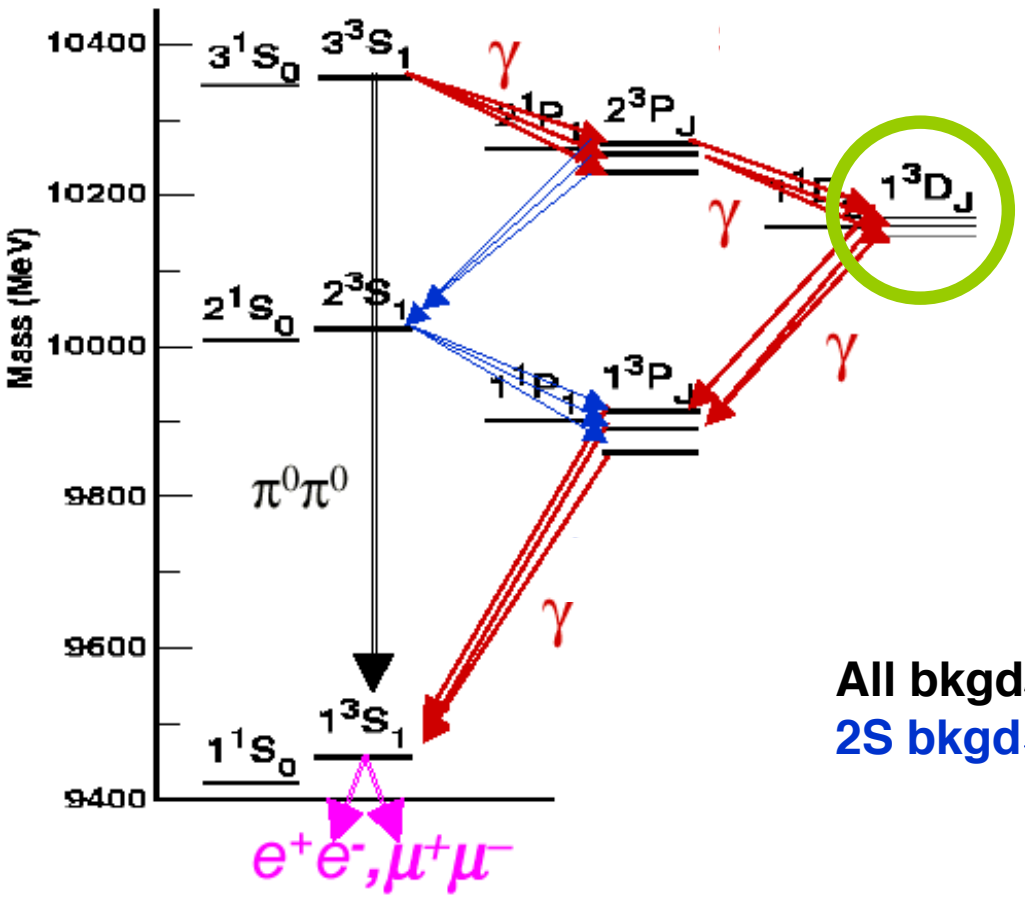


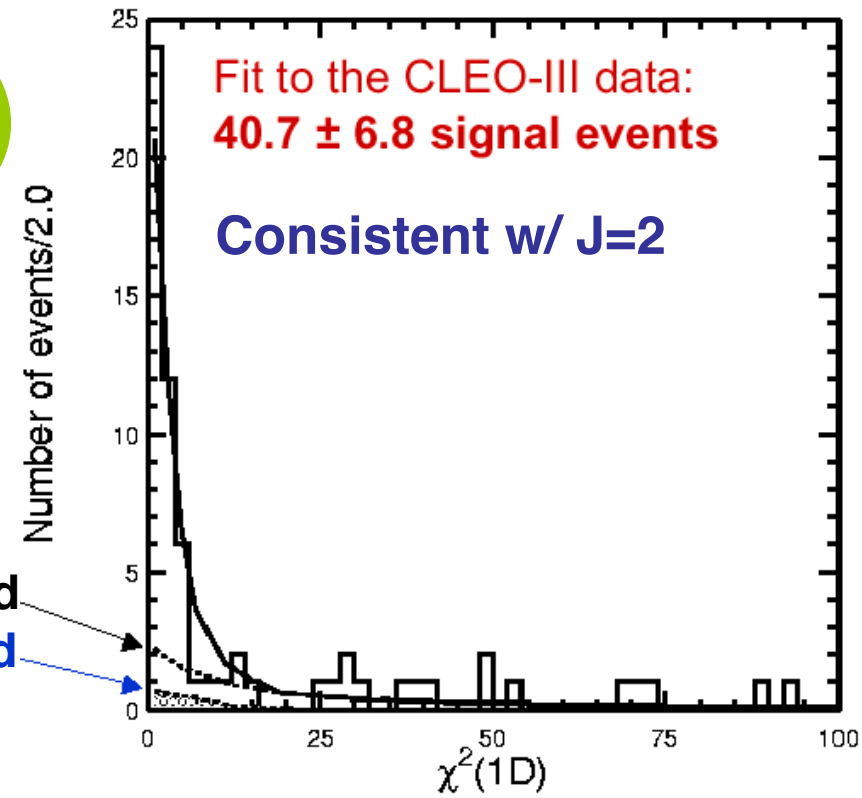
$$|V_{ub}| = (3.32 \pm \underbrace{0.21^{+0.17}_{-0.19}}_{\text{expt.}} \underbrace{^{+0.55}_{-0.39} \pm 0.12 \pm 0.07}_{\text{model}}) \times 10^{-3}$$

CLEO measurements of $|V_{ub}|$ and $|V_{cb}|$ benefit from detector maturity and continue to be the most precise.

Discovery of $b\bar{b}$ D states

Recent Υ(3S) data reveal the $b\bar{b}$ D states

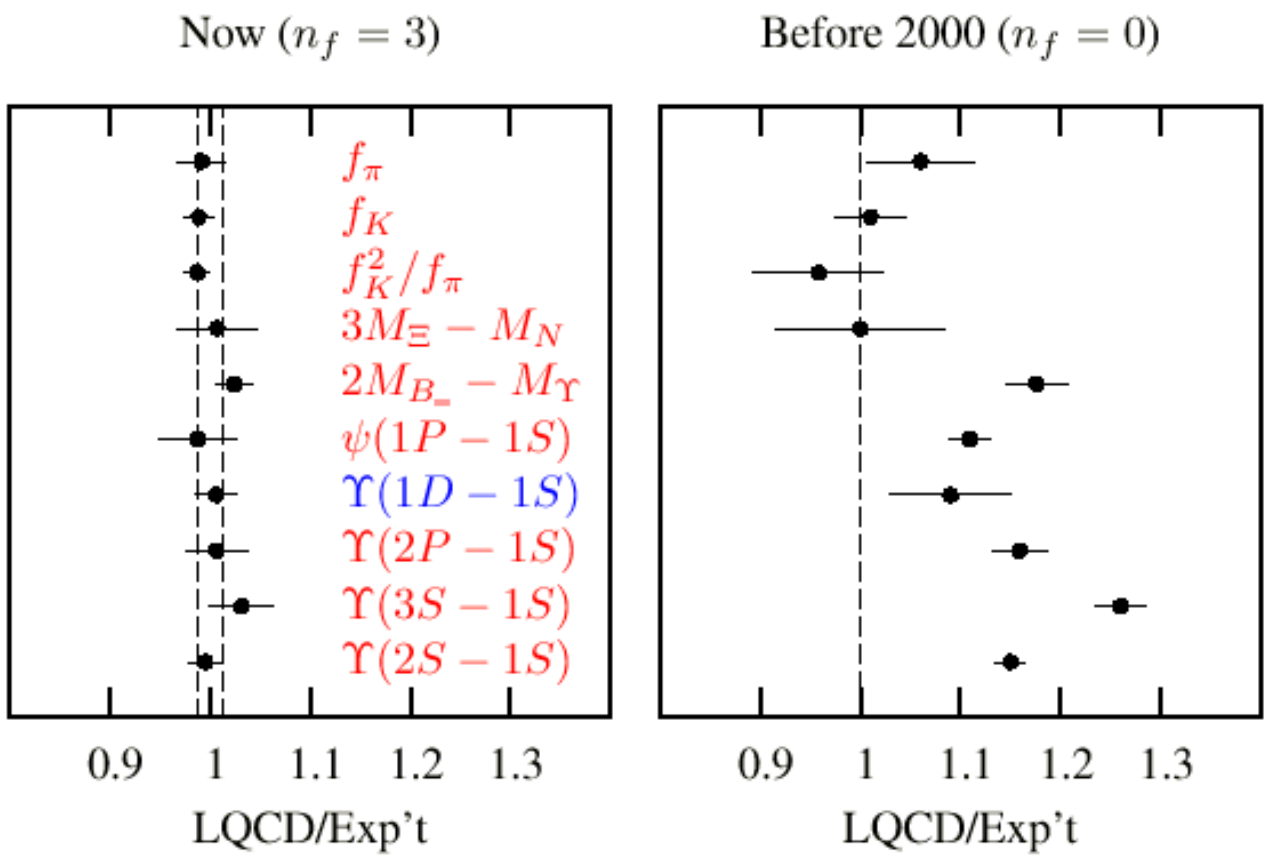




$m_{1^3D_J} = 10162.2 \pm 1.6$ MeV/c^2

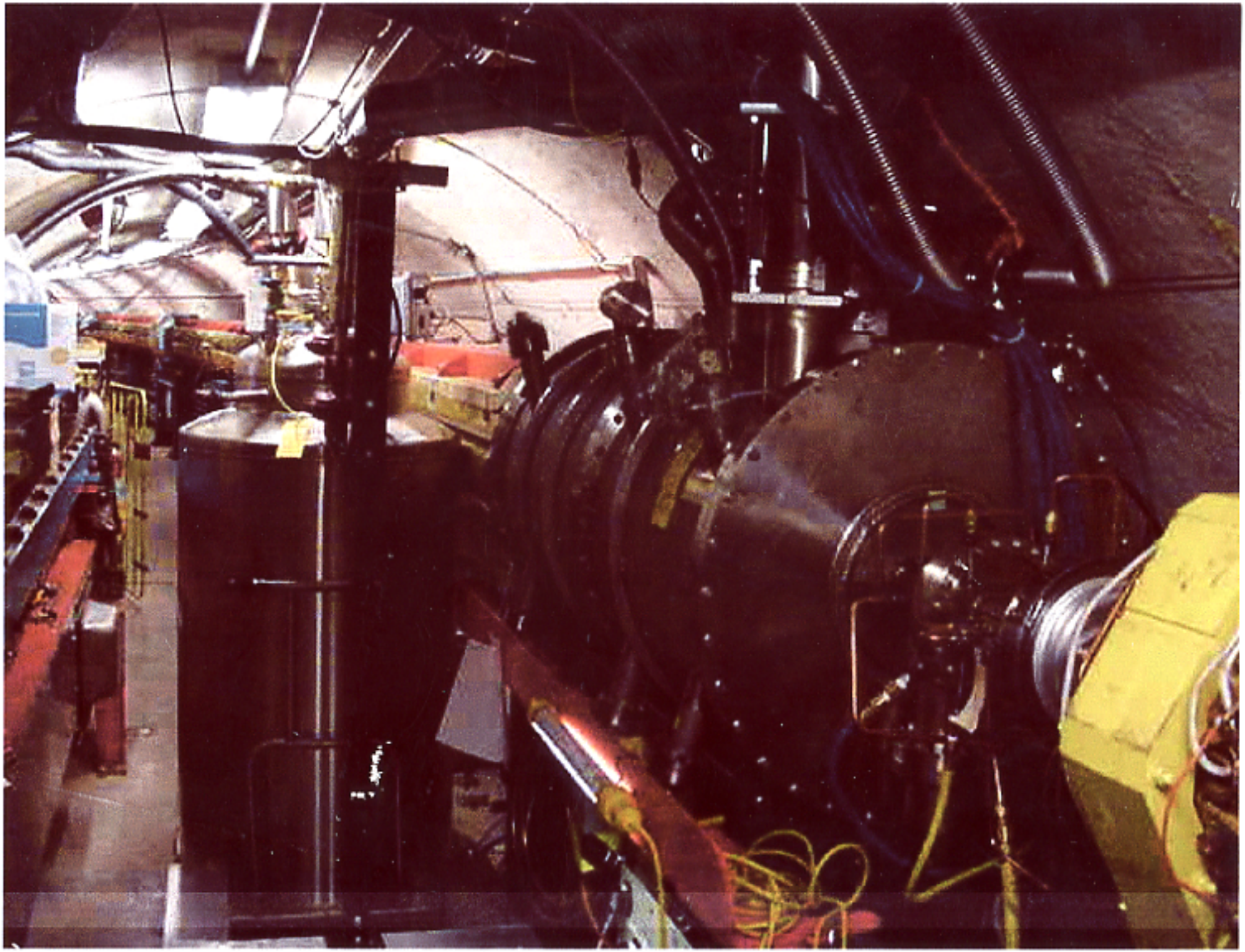
Comparison with Lattice prediction

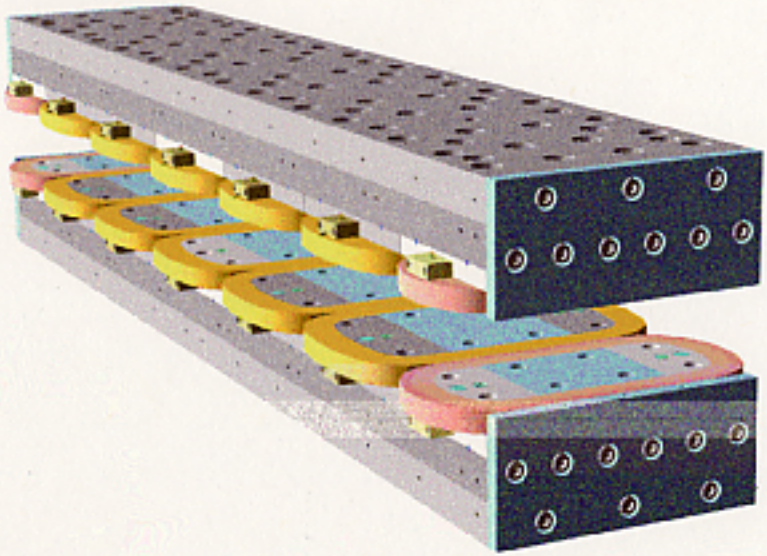
⇒ New results: (lattice QCD)/(experiment) — no free parameters!

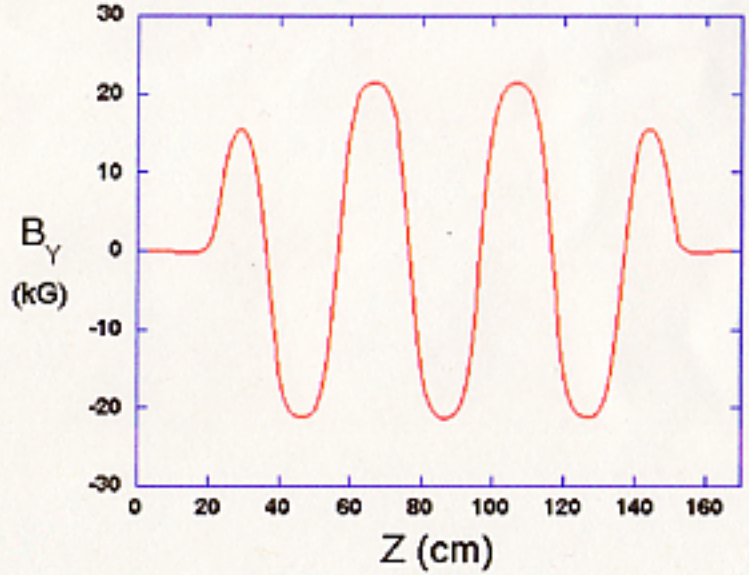


HPQCD+MILC: Very Preliminary

P. Lepage



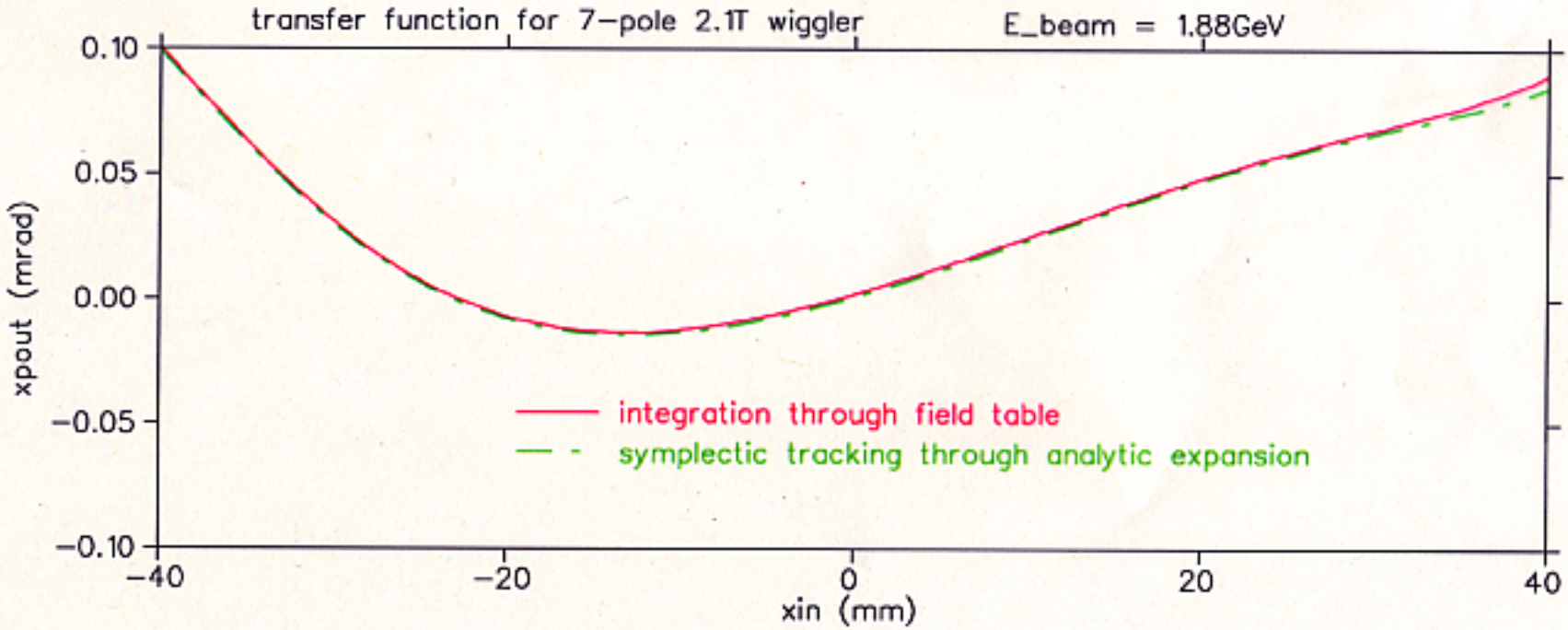


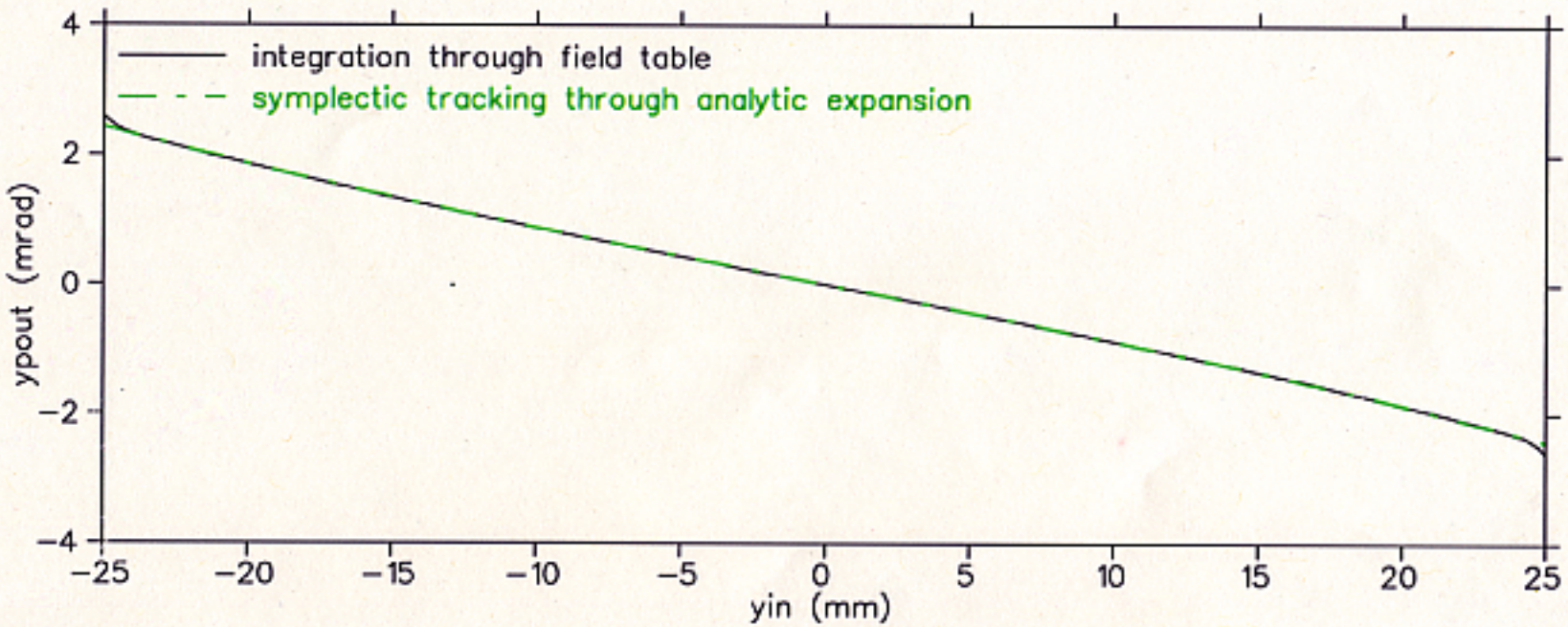


$$B_y = -B_0 \sum_{m,n} C_{mn} \cos(k_x x) \cosh(k_{ym} y) \cos(k_{zn} z + \theta_{zn})$$

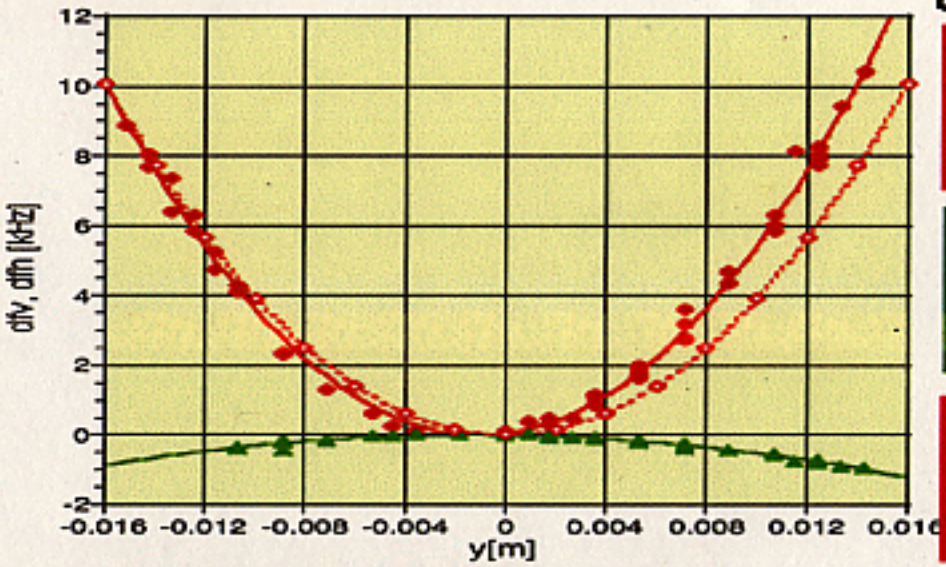
$$B_z = B_0 \sum_{m,n} C_{mn} \frac{k_x}{k_{ym}} \sin(k_x x) \sinh(k_{ym} y) \cos(k_{zn} z + \theta_{zn})$$

$$B_y = B_0 \sum_{m,n} C_{mn} \frac{k_{zn}}{k_{ym}} \cos(k_x x) \sinh(k_{ym} y) \cos(k_{zn} z + \theta_{zn})$$


transfer function for 7-pole 2.1T wiggler
E_beam = 1.88GeV
0.10
0.05
0.00
-0.05
-0.10
xpout (mrad)
-40
-20
0
20
40
xin (mm)
integration through field table
symplectic tracking through analytic expansion


4
2
0
-2
-4
ypout (mrad)
-25
-20
-15
-10
-5
0
5
10
15
20
25
yin (mm)
integration through field table
symplectic tracking through analytic expansion

Fv and Fh versus vertical orbit position in 14E SC wiggler.
(CESRc MS Oct 14? 2002, DHR, ST)



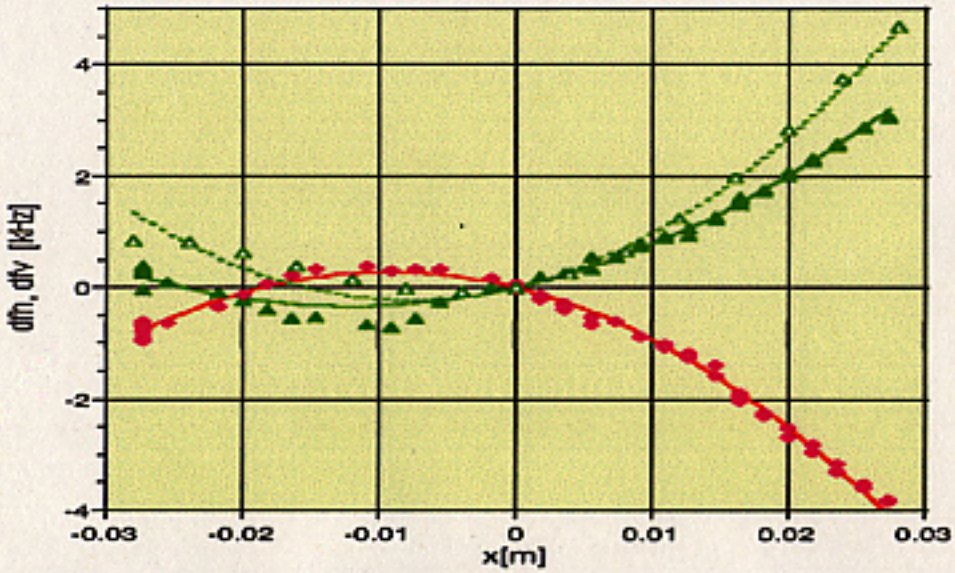
dfv - measured
dfh - measured
dfv - predicted from VF calculation

y = m1*(m0-m2)^ 2 , dfv -meas		
	Value	Error
m1	4.49e+04	237
m2	-0.00103	3.27e-05
Chisq	5.03	NA
R	0.997	NA

y = m1*(m0-m2)^ 2, dfh - meas		
	Value	Error
m1	-4.01e+03	89.6
m2	-0.00126	0.000136
Chisq	0.106	NA
R	0.991	NA

y = m1*(m0-m2)^ 2 , dfv -calc		
	Value	Error
m1	3.94e+04	0.155
m2	2.24e-13	2.59e-08
Chisq	1.02e-07	NA
R	1	NA

Fv and Fh versus horizontal orbit position in 14E SC wiggler.
(CESRc MS Oct 14? 2002, DHR, ST)



dfh - measured
dfv - measured
dfh - predicted from VF calculation

y = m1*m0 + m2*m0^ 2		
	Value	Error
m1	55.18	0.92147
m2	2276.1	40.127
Chisq	0.87096	NA
R	0.99309	NA

y = m1*m0 + m2*m0^ 2		
	Value	Error
m1	-60.438	0.83713
m2	-3250.5	36.455
Chisq	0.71883	NA
R	0.99581	NA

y = m1*m0 + m2*m0^ 2		
	Value	Error
m1	59.479	3.3099
m2	3832.7	143.18
Chisq	0.63804	NA
R	0.98927	NA