

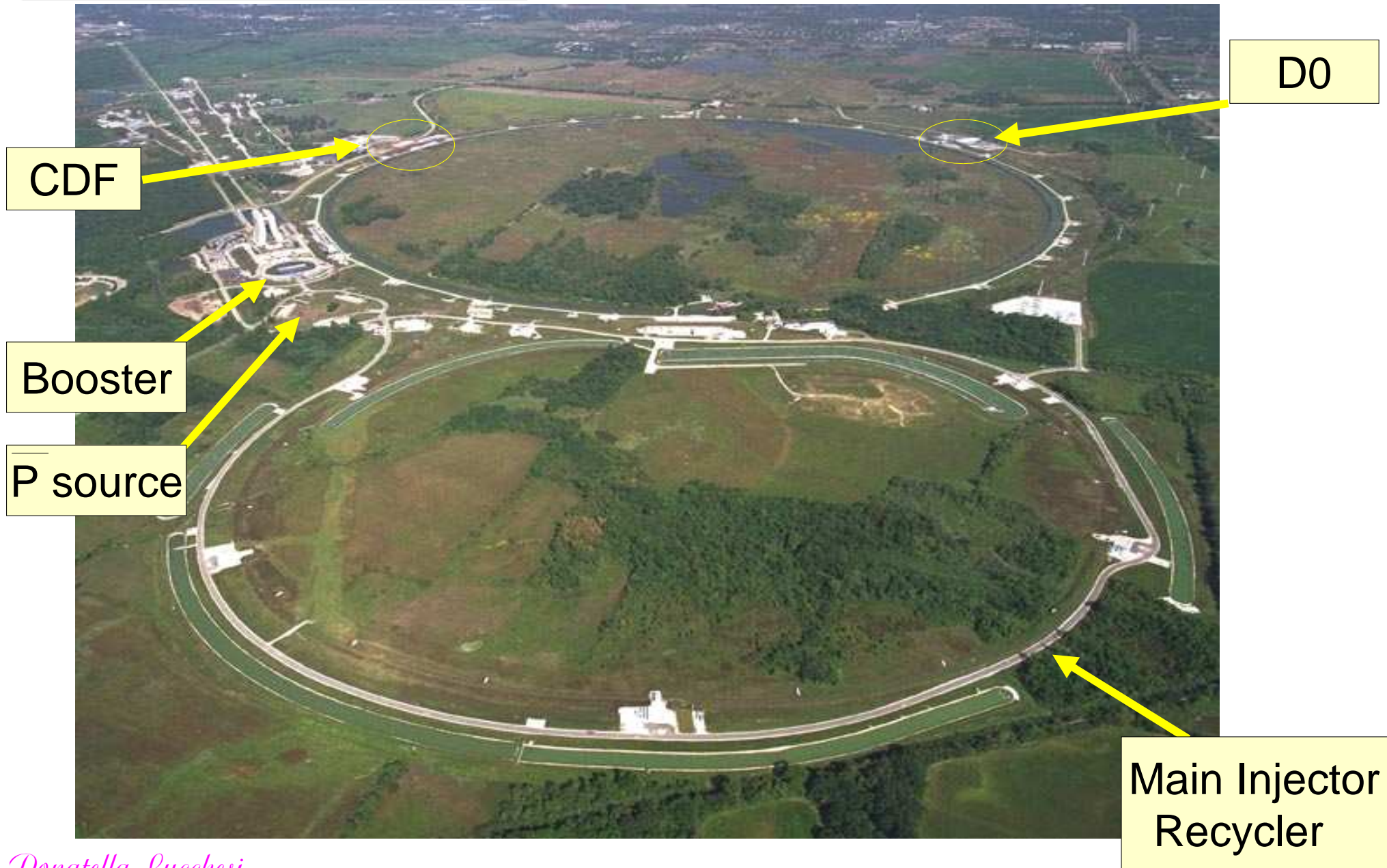
# Fisica del B all'esperimento CDFII

Padova, 21 maggio 2002

*D. Lucchesi*

- Tevatron status and prospects
- CDFII status
- Preliminary results from first data
- Plans for short and long term future

# The new machine



# The accelerator complex

1. Run I (1992–1995):  $110\text{pb}^{-1}$

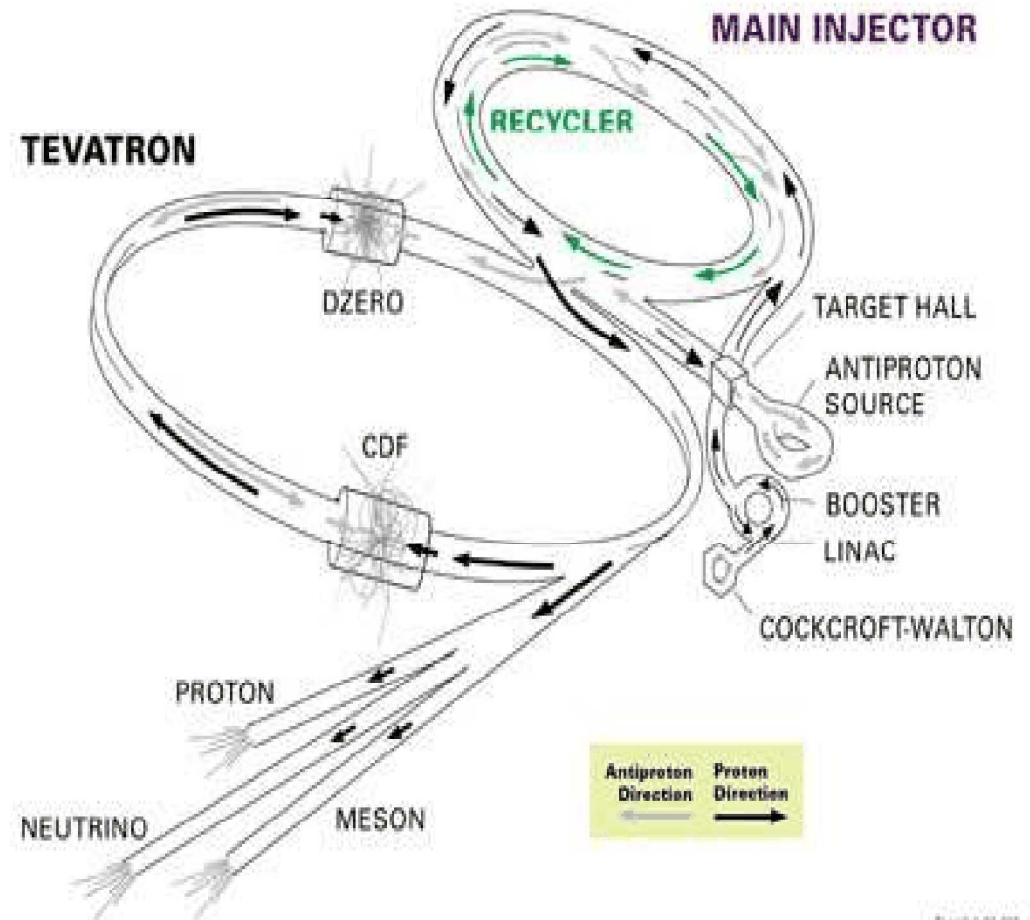
2. Run IIa (2001–2004):  $2\text{fb}^{-1}$

- Main Injector: x5  
150 GeV p storage ring
- Recycler: x2–3 (2003–4)  
Re-cools p from Tevatron
- N bunches 36 (396 ns)  
108 (132 ns)
- Beam energy : 980 GeV

3. Run IIb (2005–2007):  $15\text{fb}^{-1}$

- electron cooling, crossing angle, electron lens

FERMILAB'S ACCELERATOR CHAIN



Fermilab 05-005

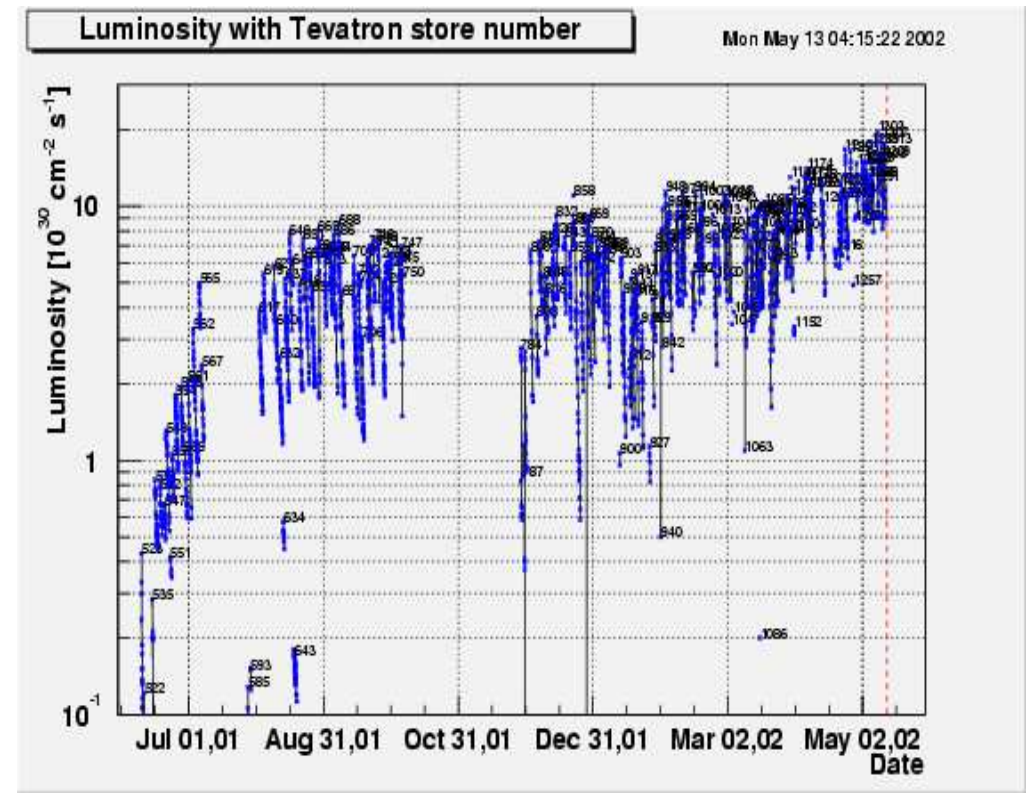
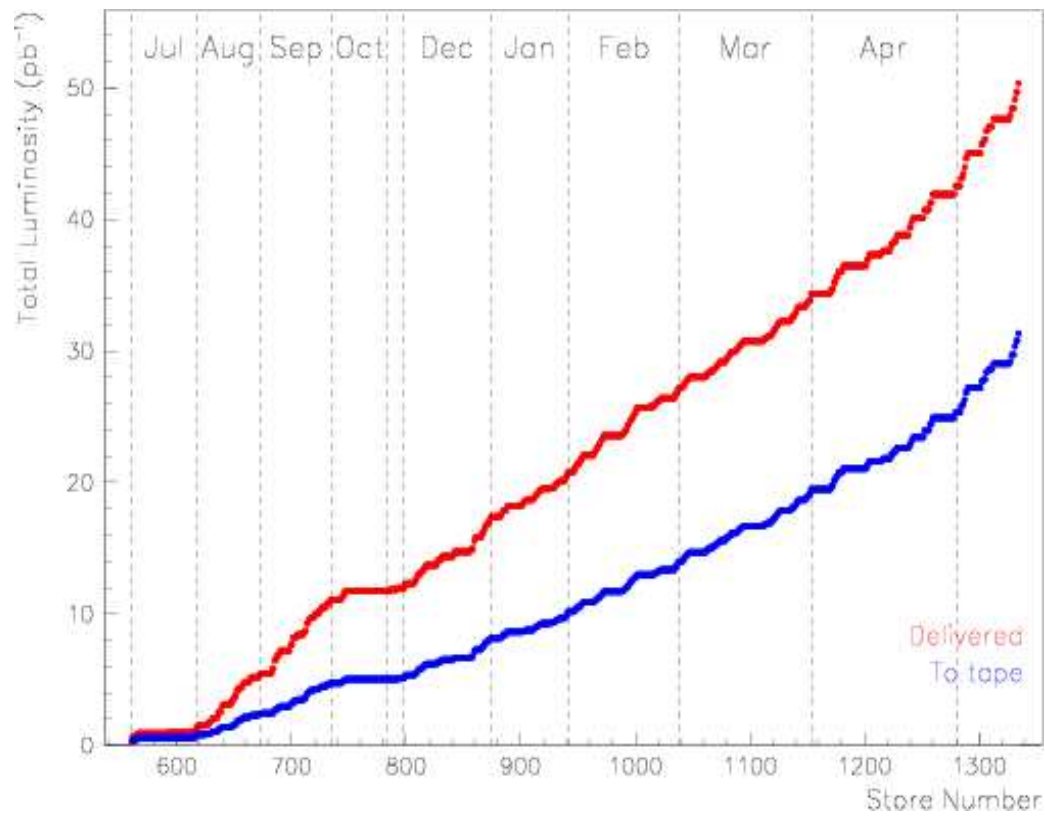
# Tevatron Improvement

$$L = N_p B N_{\bar{p}} f_0 / 4\pi s^2$$

Run	Ib(93–95) (6x6)	Ila (36x36)	Ila (140x103)	Ilb (140x103)	
$N_p$	$2.3 \times 10^{11}$	$2.7 \times 10^{11}$	$2.7 \times 10^{11}$	$2.7 \times 10^{11}$	
$N_{\bar{p}}$	$5.5 \times 10^{10}$	$3.0 \times 10^{10}$	$4.0 \times 10^{10}$	$1.0 \times 10^{11}$	
$B n_{\bar{p}}$	$3.3 \times 10^{10}$	$1.1 \times 10^{12}$	$4.2 \times 10^{12}$	$1.1 \times 10^{13}$	
$\bar{p}$ prod. rate	$6.0 \times 10^{10}$	$1.0 \times 10^{11}$	$2.1 \times 10^{11}$	$5.2 \times 10^{11}$	hr <sup>-1</sup>
$L_{\text{peak}}$	$0.16 \times 10^{31}$	$0.86 \times 10^{32}$	$2.1 \times 10^{32}$	$5.2 \times 10^{32}$	cm <sup>-2</sup> s <sup>-1</sup>
Bunch spacing	~3500	396	132	132	ns
$N_{\text{int}}/\text{crossing}$	2.5	2.3	1.9	4.8	



# Recent Machine performance



# The CDF detector

Muon system

Central Calor.

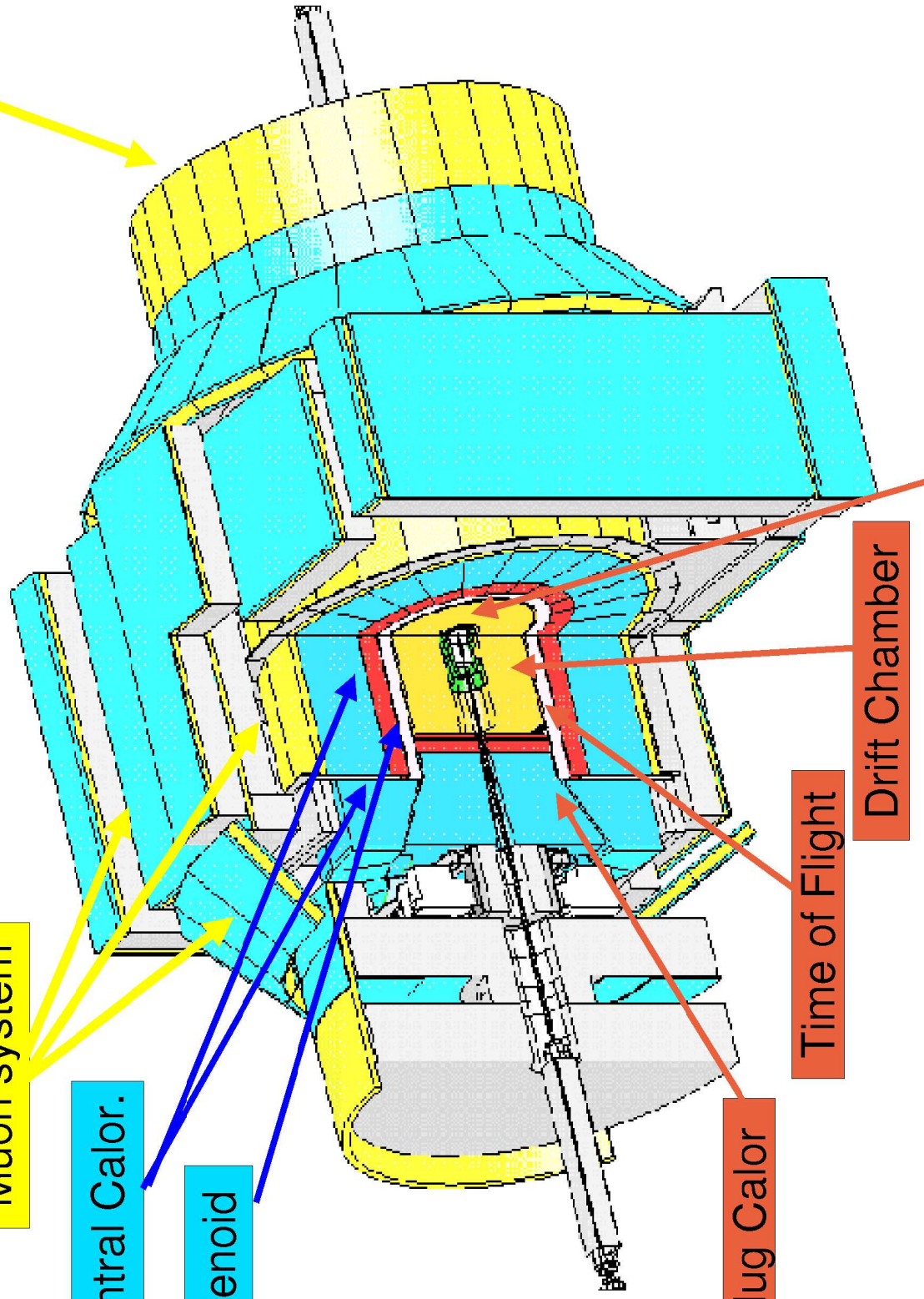
Solenoid

Forward Muon

Old

Partially New

New



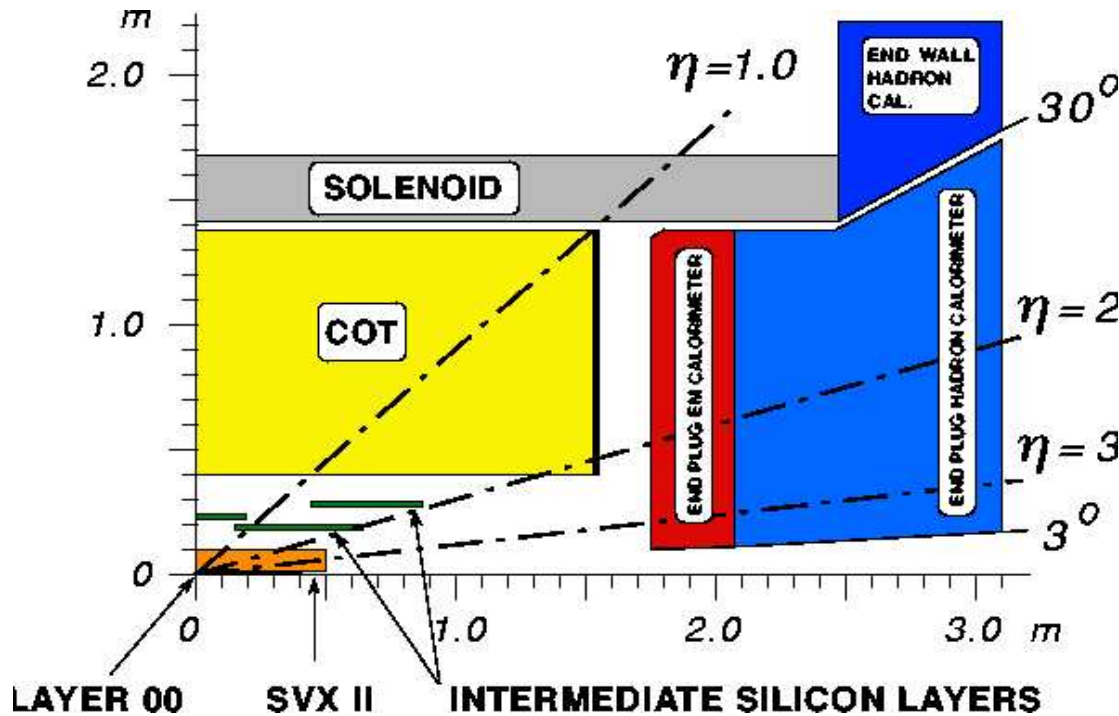
Silicon Microstrip Tracker

Drift Chamber

Time of Flight

Plug Calor

# Tracking System: COT



N of layers: 96(8 SL - 12 L/SL)

Angles:  $+3^\circ -3^\circ +3^\circ -3^\circ$

Lorentz angle  $35^\circ$

Max. drift time 100 ns

Gas: Ar-Et-CF<sub>4</sub> (50:35:15)

Instrumented for dE/dx

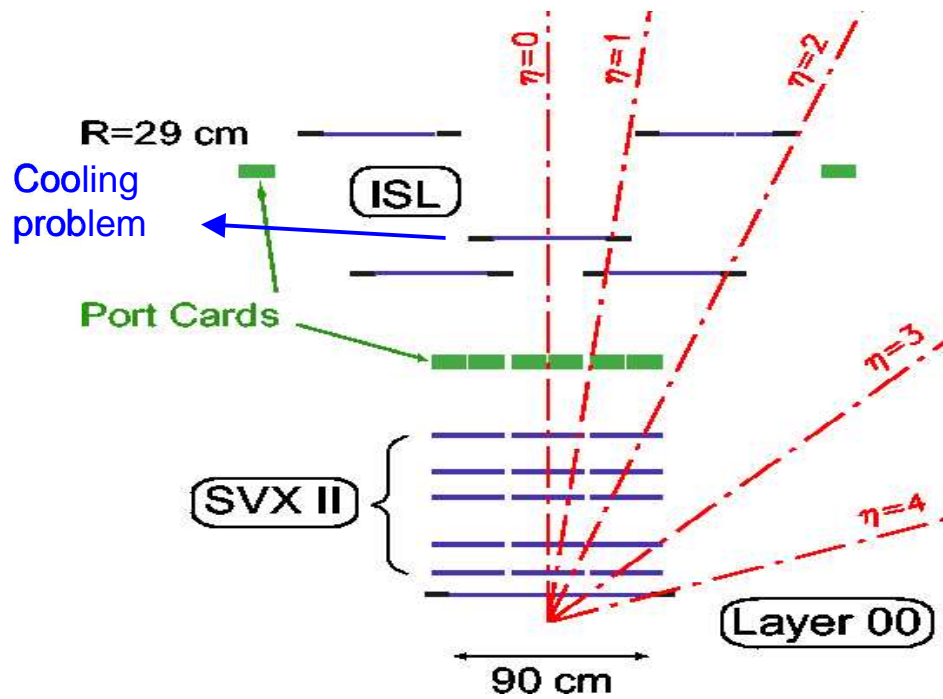
Hit resolution  $\sim 200 \mu\text{m}$

$\delta p_t/p_t^2 \sim 0.3\% (\text{GeV}/c)^{-1}$

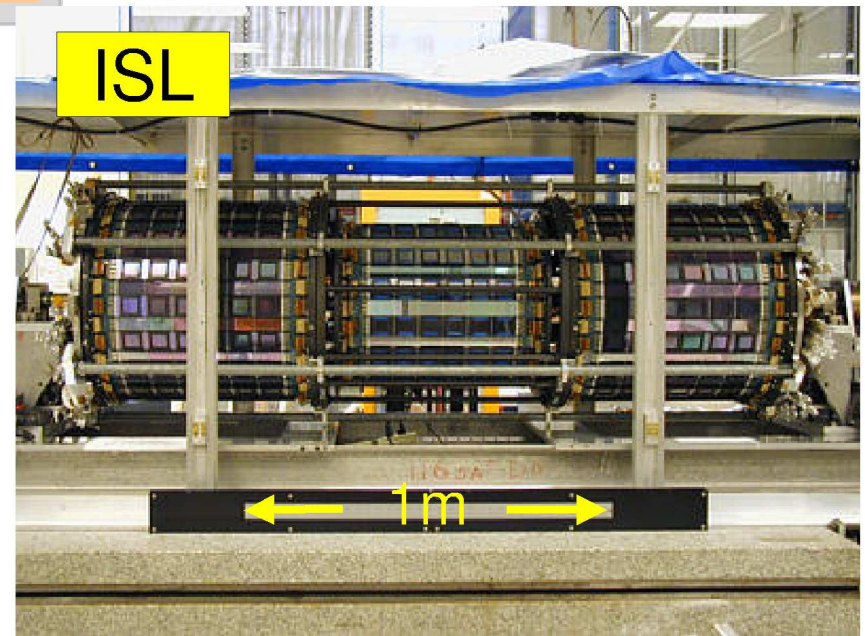
$z_0$  resolution  $\sim 5 \text{ mm}$



# Tracking System: Silicon Tracker

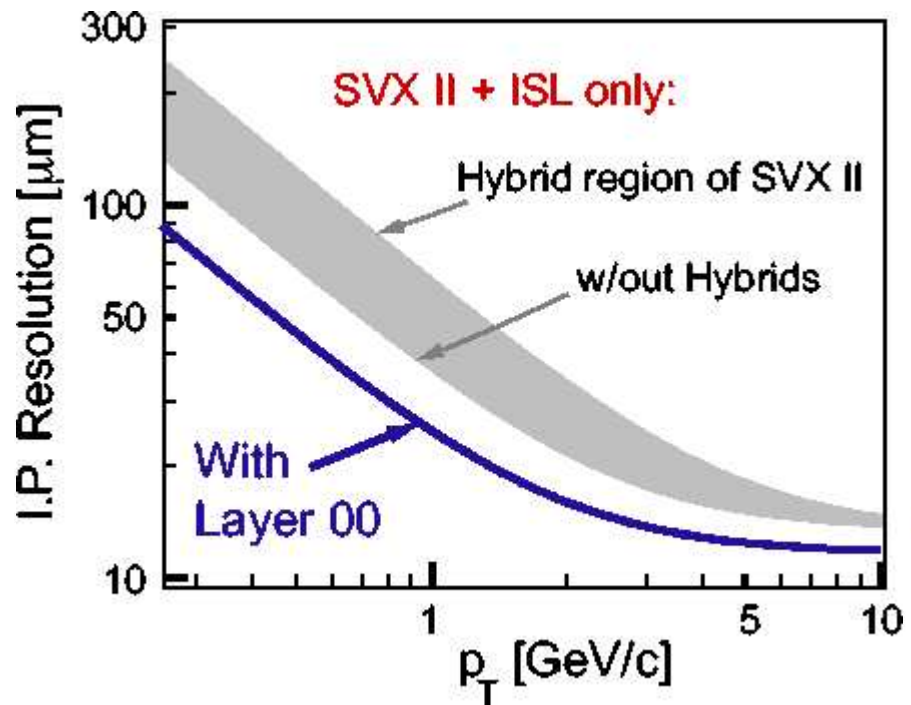


Double sided microstrip  
Increased z coverage  
L00 (single sided)  $r_{in}=1.35$  cm  
Impact parameter resolution  
 $\sigma_{\phi} < 30 \mu\text{m}$        $\sigma_z < 60 \mu\text{m}$





# Tracking Performances

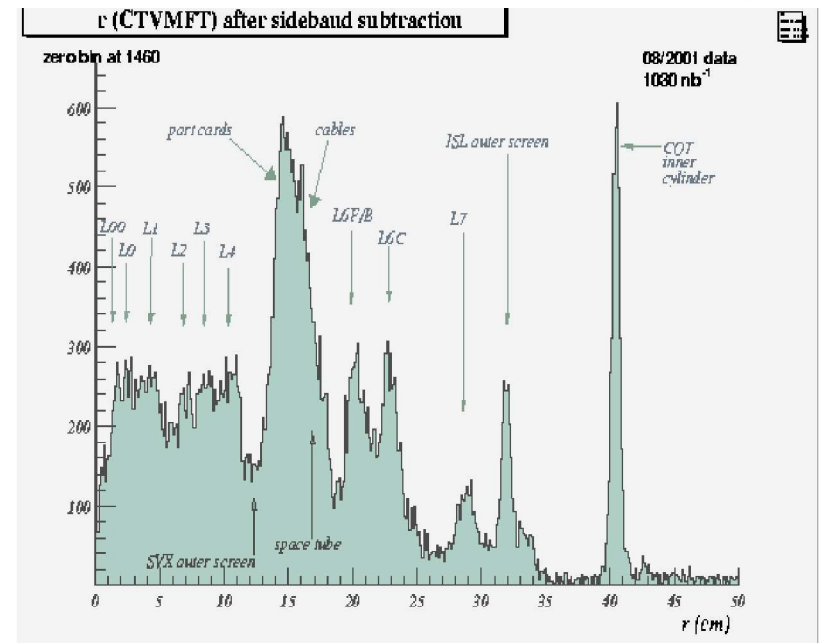
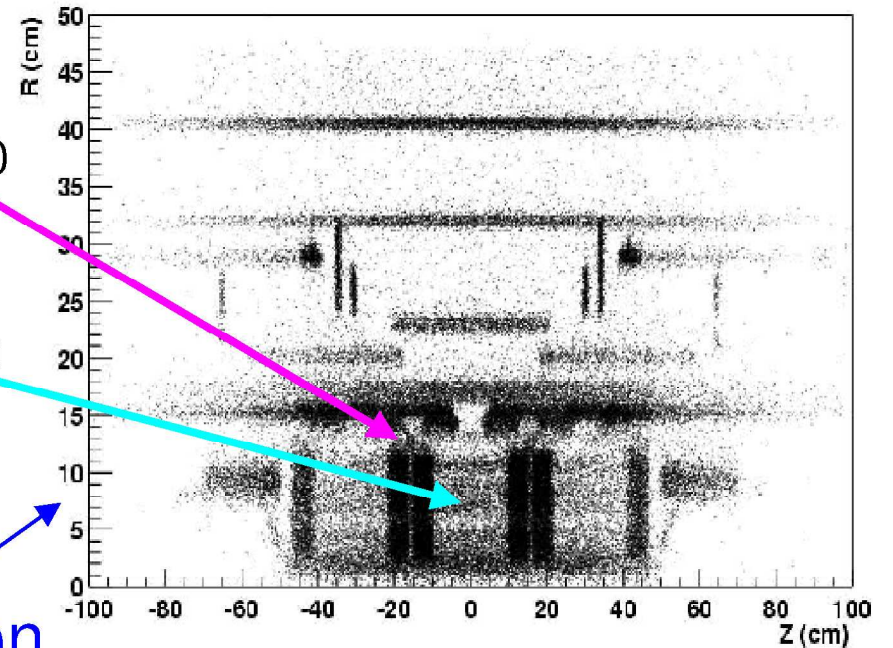


L00 still commissioning  
 SVXII not yet stable  
 Tracking under optimization

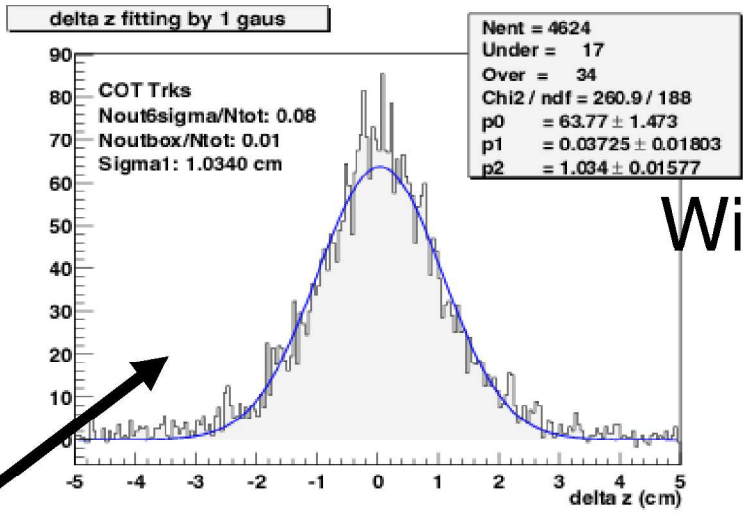
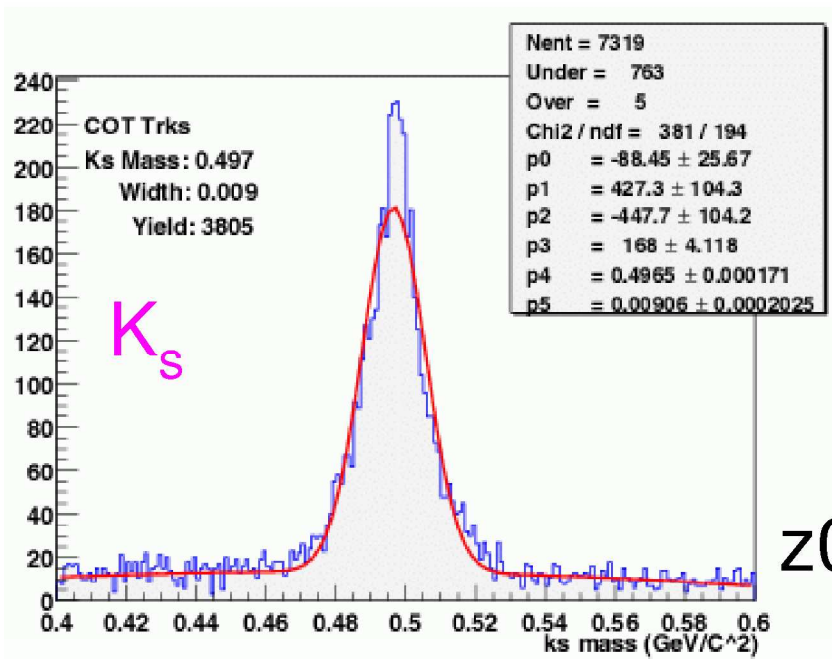
$\sim 35\% X_0$

$\sim 10\% X_0$

Material distribution



# Tracking Performances

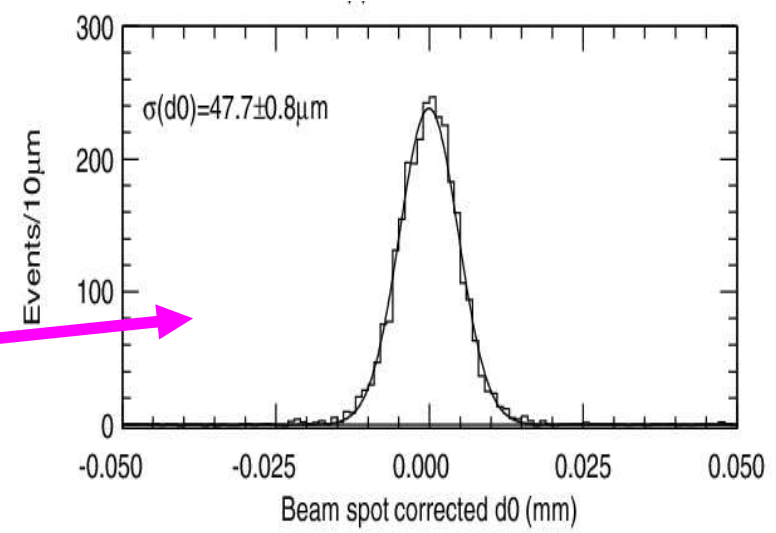


With Si ~2 mm

z0 resolution

Impact Parameter resolution  
 COT ~400 μm

$J/\psi \rightarrow \mu\mu$  (SVX):



$Z \rightarrow \mu\mu$   
 $\sigma d \sim 33 \mu\text{m}$