



Magnetic field

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- J/psi mass is lower by ~ 25 MeV
 - ◆ 0.7% of mass
 - ◆ 30% of mass resolution
 - ◆ If all comes from magnetic field : + 140 G field change
- Possible explanations
 - ◆ Magnetic field
 - ◆ dEdx in unaccounted Tracker material
 - ◆ Something else
- Before tweaking material we need to set the field to the best known value - these slides try to determine what this value is
- I did not do much - just collected available information (thanks to R.Smith, V.Korablev, S.Kulik, B.Hoeneisen, D.Denisov)



Available information

- **Measurements**

1. **NMR probes (1-2 G absolute scale precision)**

- ▲ 4 probes at $R=53.5$ cm (near solenoid)
- ▲ Last measurement done in the end of Nov 2003 shutdown. There is some spread between the probes and during change of polarities :
20135 - 20147 G
 - Confirmed previous measurements
- ▲ Propose to use $B_z = 20140 \pm 5$ G as measured value

2. **Hall probes : continuous monitoring during data taking**

- ▲ Field is stable to a few G
- ▲ Reversal of polarities is reproducible to a few G

3. **Field mapping by Hall probes in 1999**

- ▲ Field map is available, see D0 note 4234
- ▲ However it's not used because of controversies on the behavior of Hall probes during the measurements especially in the forward region

4. **NMR measurement at $R=0$ in 1999 with toroids opened**

- ▲ $B_z = 20032$ G
- ▲ Predicts $B_z = 20044$ G if the effect of closing of toroids is taken from TOSCA calculation



Field in D0reco

- D0reco uses results of TOSCA computations, see D0 note 3874
 - ◆ Inputs : steel configuration, B-H curves, currents
 - ◆ Scaled by small amount (ex solenoid by 0.997) by experts to satisfy better Maxwell equations (my interpretation)
 - ◆ Give
 - ▲ $B_z = 20002 \text{ G}$ at $R=0$ (measured 20044 G , see page 2)
 - ▲ $B_z = 20098 \text{ G}$ at $R=53.5 \text{ G}$ (measured 20140 G , see page 2)
 - ◆ $\Delta B_z = 96 \text{ G}$ D0reco vs 96 G measured (pretty good!)
- Propose to increase B_z from 20002 to 20044 G at $R=0$
 - ◆ Do this by scaling solenoid field by $+0.22\%$
 - ◆ D0reco has a scale factor allowing to do so
 - ◆ Will solve $\sim 1/3$ of the J/psi mass deficit
- When and how to implement? Up for discussion here