


B physics studies

Evangelos Gazis

**National Technical University of Athens
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Colleagues

- T. Alexopoulos (contact person)
- R. Avramidou
- E.N. Gazis
- F. Antoniou (M.Sc. Student)

- S. Maltezos
- G. Tsipolitis
- A. Tzamariudaki



Motivation I

Belle Collaboration measurement (2002) :

$$\sigma(e^+e^- \rightarrow \psi\eta_c) > 33 \text{ fb}$$

found an order of magnitude higher than theory !!

Explanation : the intrinsic motion of the quarks inside mesons can significantly decrease the virtuality of intermediate particles and raise the cross section



Motivation II

Other processes with similar problem :

$$\chi_{0,2} \rightarrow VV$$

where the decay of scalar and tensor mesons into two vectors,

$$\chi_{c0,2} \rightarrow \rho\rho, \phi\phi$$

$$\chi_{b0,2} \rightarrow \psi\psi$$

Only known experimental value:

$$Br(\chi_{c0} \rightarrow \phi\phi) = (1.0 \pm 0.6) \cdot 10^{-3}$$

$$Br(\chi_{c0} \rightarrow \phi\phi) = 0.9 \cdot 10^{-3} \text{ (theory)}$$

was much greater than the theoretical prediction, but the theory modified with the internal motion of the quarks



Motivation III

Similar decays of $\chi_{b0,2}$ can be studied in the LHC energy region by the reaction :

$$p\bar{p} \rightarrow \chi_{bJ} X \rightarrow \psi\psi X$$

Taking into account the theoretical prediction :

$$Br(\chi_{b0} \rightarrow \psi\psi) = 3 \cdot 10^{-5}$$

Which has been raised to after the proper correction:

$$Br(\chi_{b0} \rightarrow \psi\psi) = 2 \cdot 10^{-4}$$



Searches

□ Two channels:

□ $X_b \rightarrow J/\psi J/\psi \rightarrow \mu^+ \mu^- \mu^+ \mu^-$

□ $X_b \rightarrow J/\psi \Lambda \rightarrow \mu^+ \mu^- \pi^- p^+$



Help from Theory

- A.V. Luchinsky (IHEP)
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