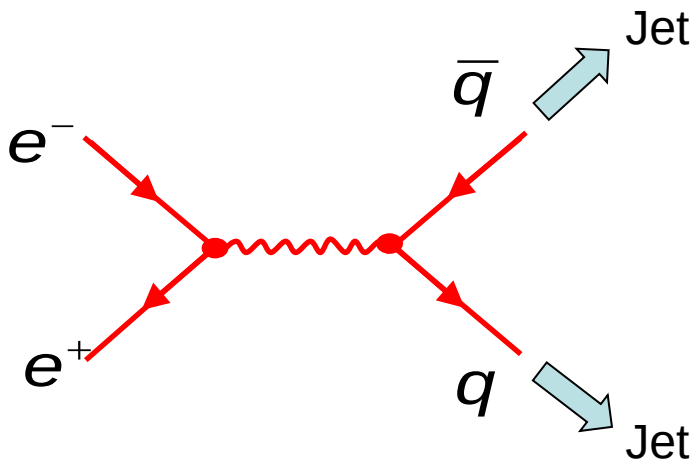
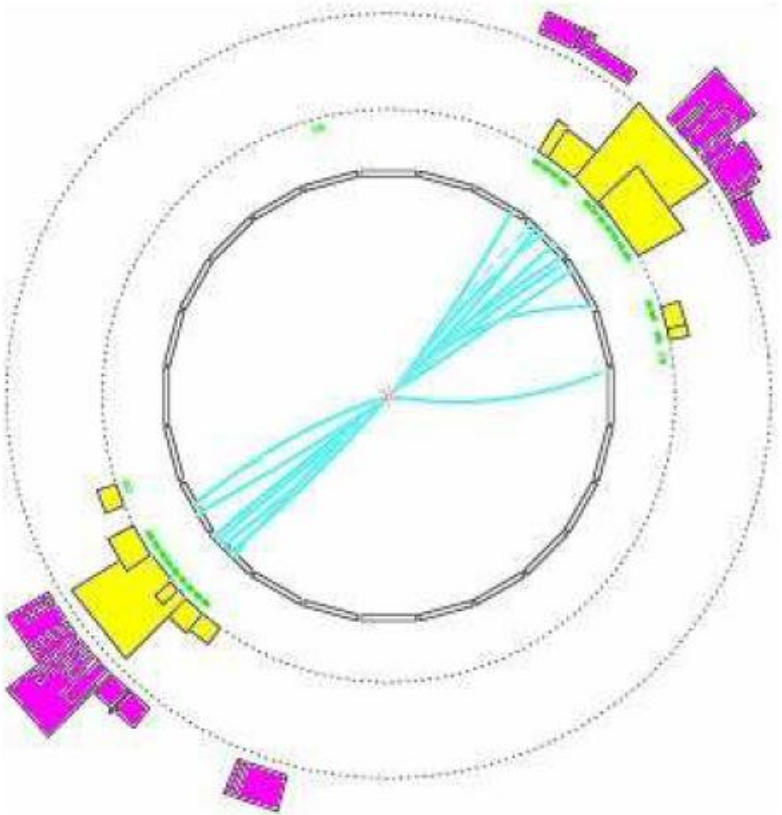
e^+e^- Annhihilation in Hadronen: 2-Jet Ereignis





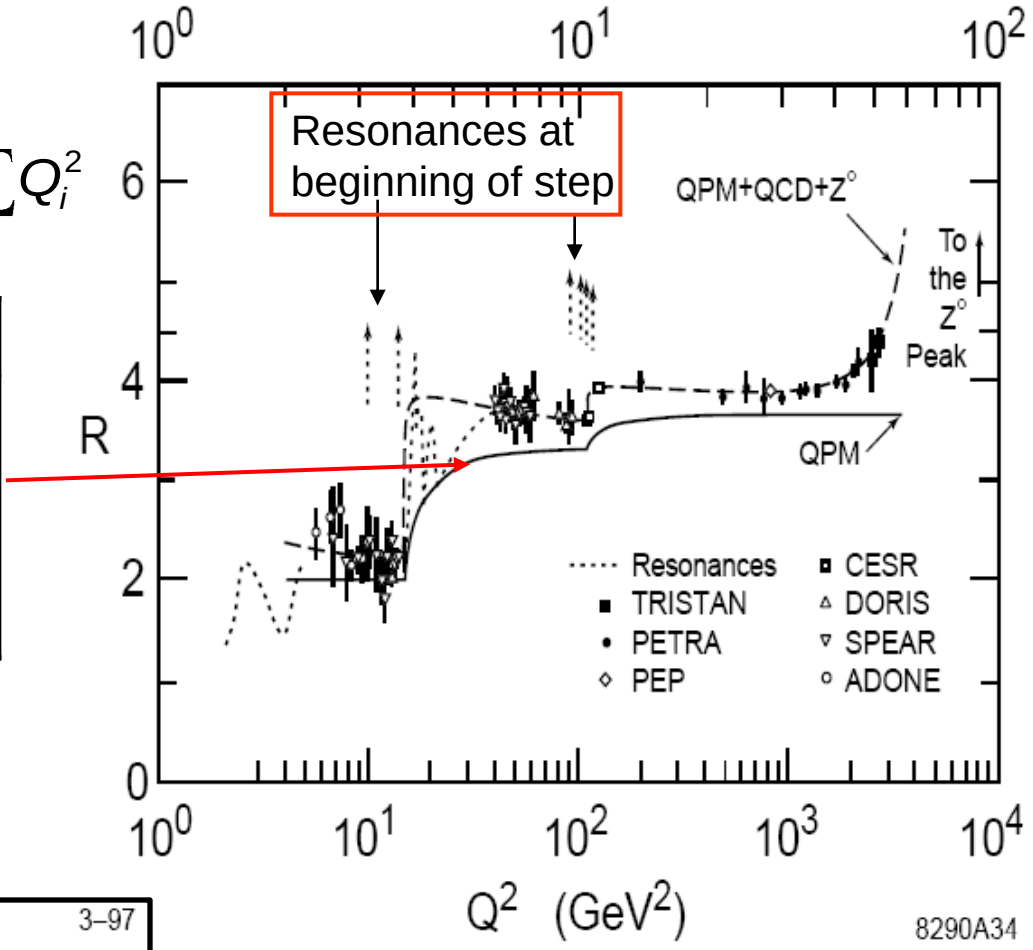
OPAL (LEP)

Fig-TP-5.1

Definition:

$$R_{had} = \frac{\sigma(ee \to hadrons)}{\sigma(ee \to \mu\mu)} = 3 \cdot \sum_i Q_i^2$$

$\sqrt{s}$	Quarks	$R_{had} = 3 \cdot \sum_i Q_i^2$
< ~3 GeV	uds	3·6/9=2.00
< ~10 GeV	udsc	3·10/9=3.33
< ~350 GeV	udscb	3·11/9=3.67
> ~350 GeV	udscbt	3·15/9=5.00



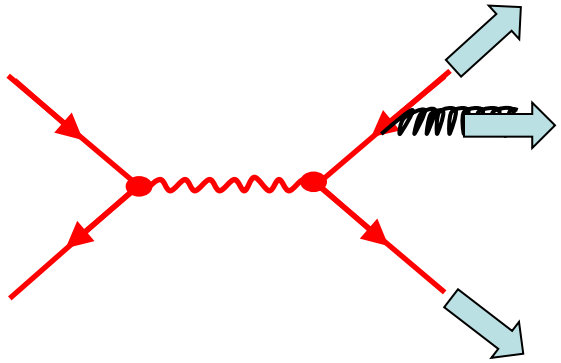
3–97

Bemerkung:
Die obige Rechnung unterschätzt das gemessene Verhältnis R_{had} bei 15-20% was an nicht berücksichtigten QCD Korrekturen liegt (s. Fig. 5.3).

Fig-TP-5.2

Entdeckung der 3-Jet Ereignisse

TASSO Kollaboration am e^+e^-
Beschleuniger PETRA / DESY (1977):



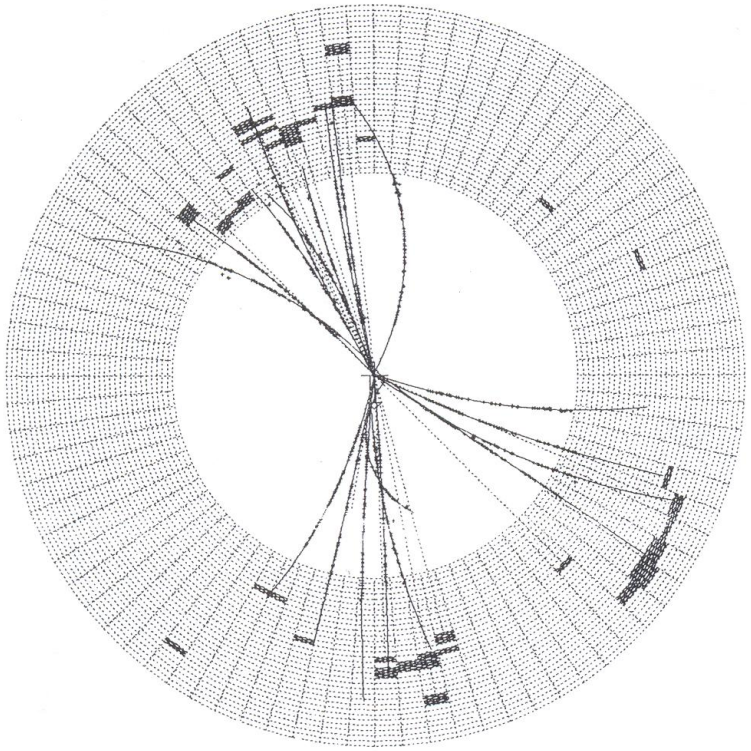


Fig. 11.12 A three-jet event observed by the JADE detector at PETRA.

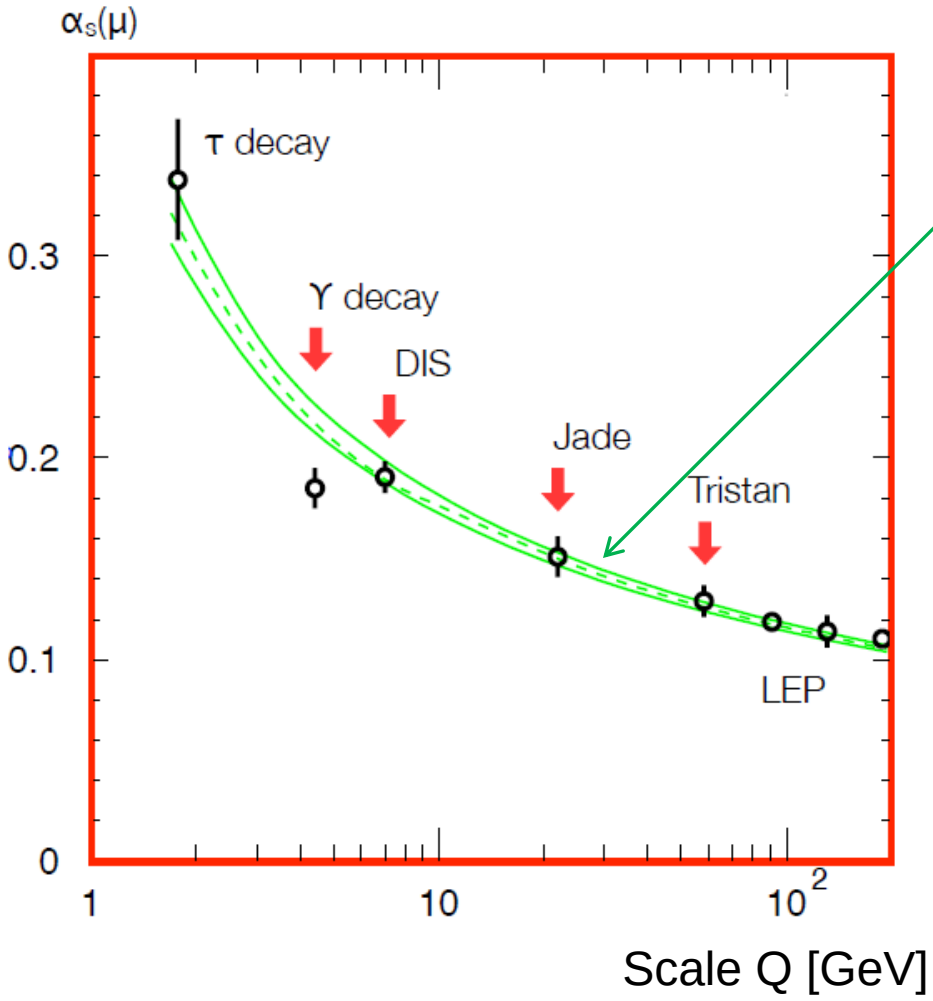
bei $\sqrt{s}$=20 GeV

$$\frac{\#3-\text{jet events}}{\#2-\text{jet events}} \approx 0.25$$

<u>Experimentelles Problem:</u>
Fluktuiertes 2-Jet oder 3-Jet Ereignis?

Fig-TP-5.3

Laufende Kopplungskonstante $\alpha_s(Q^2)$



QCD Vorhersage des Runnings
(α_s aus exp. Mittel)

Fig-TP-5.4

Vergleich: Charmonium und Positronium

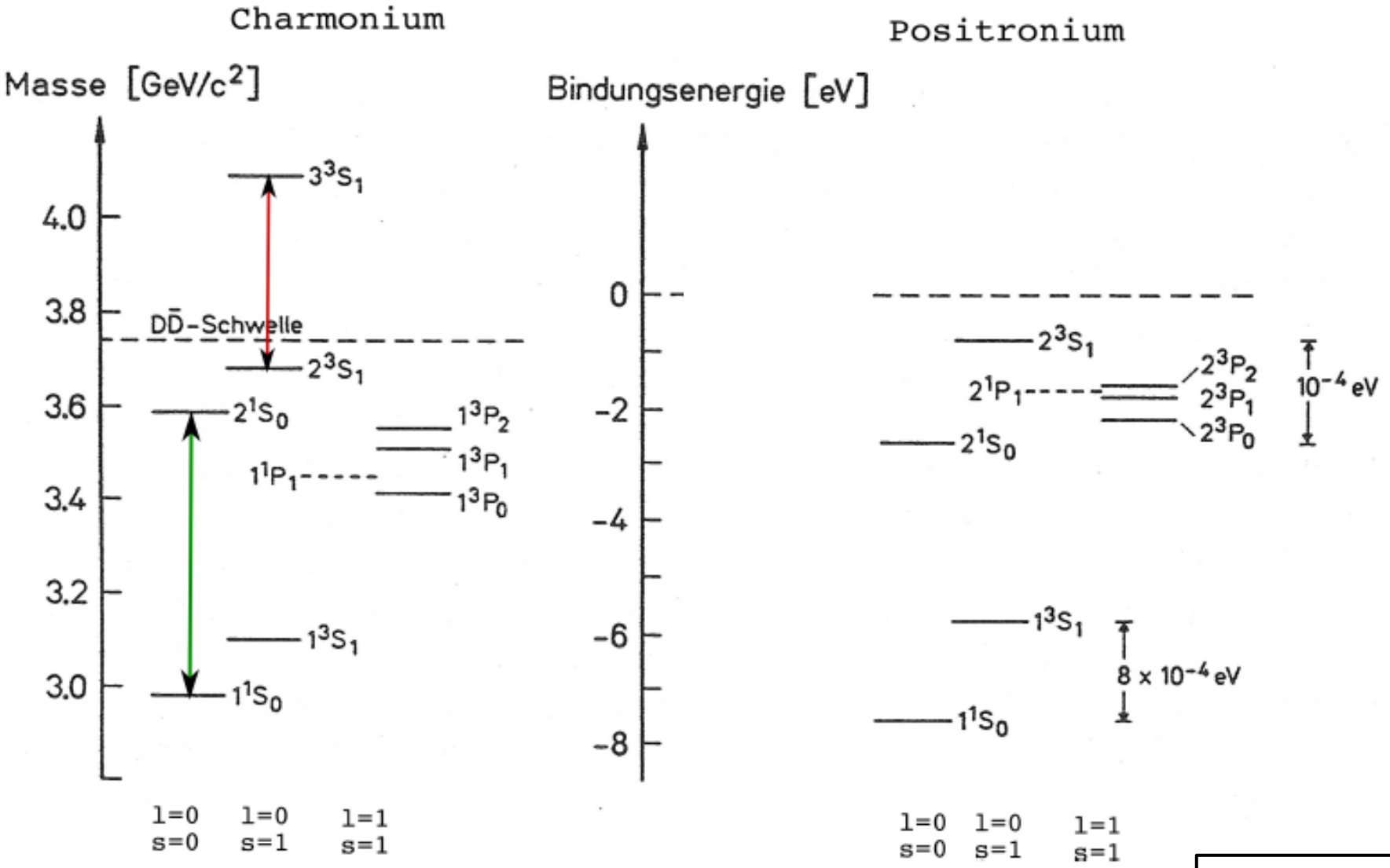
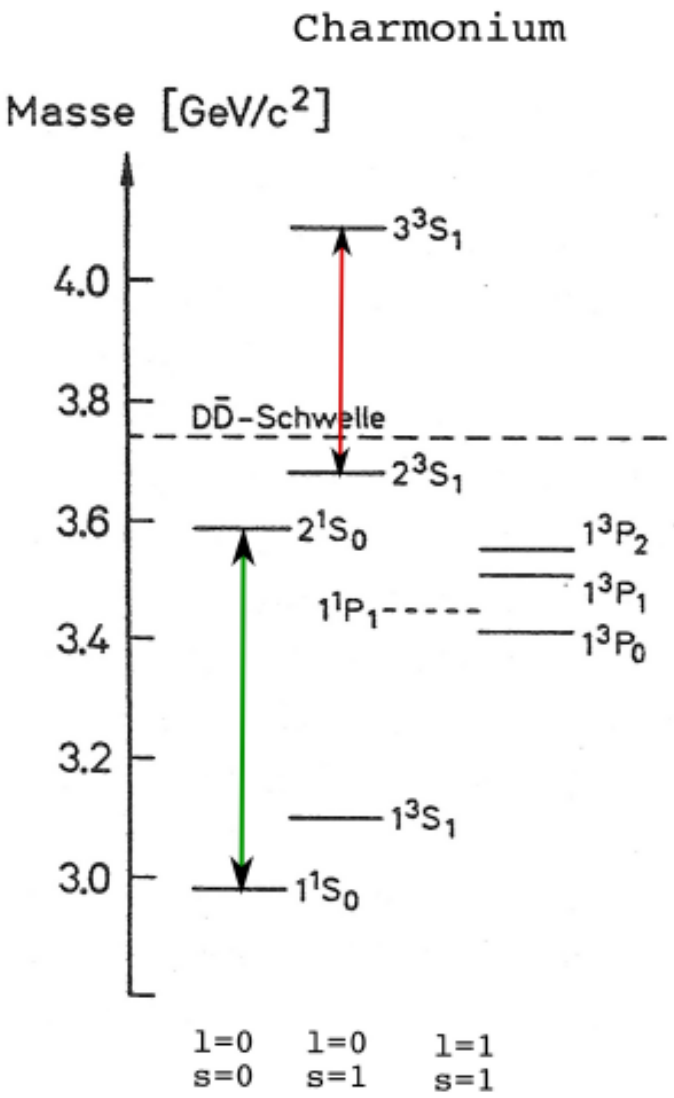


Fig-TP-5.5

Charmonium-Zustände



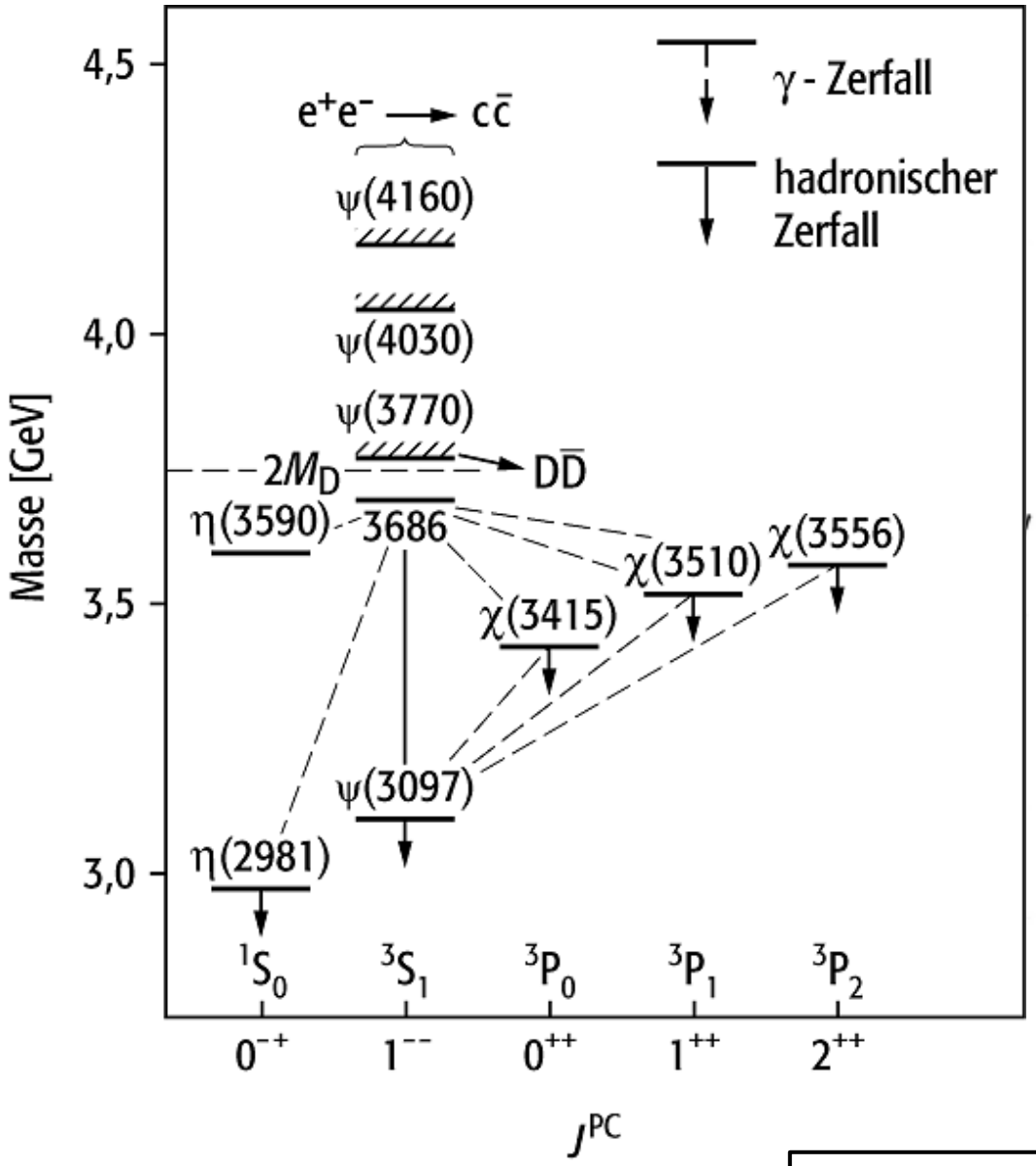


Fig-TP-5.6