THE Σ(1670) REGION

Production experiments: The measured Σπ/Σππ branching ratio for the Σ(1670) produced in the reaction $K^- p \rightarrow \pi^- \Sigma(1670)^+$ is strongly dependent on momentum transfer. This was first discovered by EBERHARD 69, who suggested that there exist two Σ resonances with the same mass and quantum numbers: one with a large Σππ (mainly Λ(1405)π) branching fraction produced peripherally, and the other with a large Σπ branching fraction produced at larger angles. The experimental results have been confirmed by AGUILAR-BENITEZ 70, ASPELL 74, ESTES 74, and TIMMERMANS 76. If, in fact, there are two resonances, the most likely quantum numbers for both the Σπ and the Λ(1405)π states are $D_{13}$. There is also possibly a third Σ in this region, the Σ(1690) in the Listings, the main evidence for which is a large Λπ/Σπ branching ratio. These topics have been reviewed by EBERHARD 73 and by MILLER 70.

Formation experiments: Two states are also observed near this mass in formation experiments. One of these, the Σ(1670)$D_{13}$, has the same quantum numbers as those observed in production and has a large Σπ/Σππ branching ratio; it may well be the Σ(1670) produced at larger angles (see TIMMERMANS 76). The other state, the Σ(1660)$P_{11}$, has different quantum numbers, its Σπ/Σππ branching ratio is unknown, and its relation to the produced Σ(1670) states is obscure.