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The BGOOD experiment at ELSA - Multi quark structures in the light quark sector

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The discoveries of the pentaquark, P_C, states and XYZ mesons in the charmed quark sector initiated a new epoch in hadron physics. The existence of exotic multi-quark states beyond the conventional $q\overline{q}$ and qqq systems has obviously been realised. Such states could manifest as single colour bound objects, or evolve from meson-baryon and meson-meson interactions, creating molecular like systems and re-scattering effects near production thresholds.

Intriguingly, similar effects may be evidenced in the light, uds sector. To study a molecular-like and spatially extended baryonic system access to a low momentum exchange and therefore forward meson production region is crucial. The BGOOD photoproduction experiment is uniquely designed to explore this kinematic region; it is comprised of a central calorimeter complemented by a magnetic spectrometer in forward directions.

BGOOD has a rich programme of strangeness photoproduction studies off both proton and neutron (deuterium) target. Recent highlights include a peak-like structure in the $\gamma n \to K^0\Sigma^0$ cross section at $W \sim 2$ GeV consistent with a meson-baryon interaction model which predicted the charmed P_C states. The $K^*\Sigma$ molecular nature of this proposed N*(2030) is also supported in our measurement of $\gamma p \to K^+\Lambda(1405)(\to \pi^0\Sigma^0)$, where it is predicted to drive a triangle singularity mechanism.

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