Abstract Submitted
for the HAW09 Meeting of
The American Physical Society

S=+1 pentaquarks in QCD sum rules PHILIPP GUBLER, Department of Physics, Tokyo Institute of Technology, DAISUKE JIDO, Yukawa Institute of Theoretical Physics, Kyoto University, TORU KOJO, RBRC, Brookhaven National Laboratory, TETSUO NISHIKAWA, Faculty of Health Science, Ryotokuji University, MAKOTO OKA, Department of Physics, Tokyo Institute of Technology
— The QCD sum rule technique is employed to investigate pentaquark states with strangeness $S = +1$ and $IJ^\pi = 0\frac{1}{2}^\pm, 1\frac{1}{2}^\pm, 0\frac{3}{2}^\pm, 1\frac{3}{2}^\pm$. Throughout the calculation, we emphasize the importance of the establishment of a valid Borel window, which corresponds to a region of the Borel mass, where the operator product expansion (OPE) converges and the presumed ground state pole dominates the sum rules. Such a Borel window is achieved by constructing the sum rules from the differenece of two carefully chosen independent correlators and by calculating the OPE up to dimension 14. As a result, we conclude that the state with qauntum numbers $0\frac{3}{2}^+$ state appears to be the most probable candidate for the experimantally observed $\Theta^+(1540)$, while we also obtain states with $0\frac{1}{2}^-, 1\frac{1}{2}^-, 1\frac{3}{2}^+$ at somewhat higher mass regions. We furthermore discuss the contribution of the KN scattering states to the sum rules, and the possible influence of these states on our results.

Philipp Gubler
Department of Physics, Tokyo Institute of Technology

Date submitted: 30 Jun 2009 Electronic form version 1.4