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Long Range Component of the Nuclear Potential TETSUO SAWADA, Institute of Quantum Science, Nihon University, Tokyo, Japan — Possible long range force of the strong Van der Waals type is searched in the nuclear potential. For the case of the short range potential, the amplitude $A(s,t)$ is regular at $t=0$, on the other hand, when the potential is long range, namely $V(r) \sim -C/r^{\alpha}$, the extra branch point $A(s,t) = C'(-t)^{\gamma} + \cdots$ with $\gamma = (\alpha-3)/2$ appears at $t=0$. Therefore if we try the polynomial fit to the amplitude, it must deviate rather abruptly from the fit in the small neighborhood of $t=0$. In terms of the partial wave, the extra branch point of the once subtracted S-wave amplitude $(a_0(\nu) - a_0(0))/\nu$ becomes a cusp $C''\sqrt{\nu}$ when the long range potential is the Van der Waals of the London type, namely $\alpha = 6$, where ν is the center of mass momentum squared. In order to see the cusp as clearly as possible, we must subtract the near-by unitarity cut (in $\nu \geq 0$) and the one-pion exchage cut (in $\nu \leq -\mu^2/4$). By fitting to the cusp, the parameters of the long range potential are determined: $\alpha = 6.09$ and $C = 0.170$, in which the Compton wave length of the charged pion is used as the unit of the length.

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