Contribution ID : **1** Type : **Poster**

A study of nucleon and $\triangle$ form factors with pion cloud effect

Tuesday, 27 October 2026 19:25 (5)

\begin{document}

\title{Understanding of electromagnetic and gravitational form factors for nucleon and Δ with pion meson cloud}

\newcommand{\email}[1]{\thanks{\href{mailto:#1}{#1}}}

\author[a,b]{Jiaqi Wang\email{jqwang@ihep.ac.cn}} \author[c]{Dongyan Fu\email{fudongyan@impcas.ac.cn}} \author[a,b]{Yubing Dong\email{dongyb@ihep.ac.cn}}

\affil[a]{Institute of High Energy Physics, Chinese Academy of Sciences, Beijing 100049, China} \affil[b]{School of Physical Sciences, University of Chinese Academy of Sciences, Beijing 101408, China} \affil[c]{Southern Center for Nuclear-Science Theory (SCNT), \authorcr Institute of Modern Physics, Chinese Academy of Sciences, Huizhou 516000, China}

\maketitle

The electromagnetic and gravitational form factors of the nucleon and $\Delta(1232)$ resonance are studied simultaneously using a covariant quark-diquark approach, and the pion cloud effect on the form factors is explicitly discussed. The calculated electromagnetic form factors of nucleon are compared to the experimental data in order to determine the parameters of our approach. Then, the gravitational form factors of the nucleon and $Delta$-isobar are evaluated with the same parameters, and moreover, the transition form factors of $N-\Delta$ are also estimated. The electromagnetic and mechanical properties, such as the charge radii, magnetic moments, and mass radii are presented. Moreover, the D-term, which is believed to be connected with the internal force inside the baryons, is also discussed. It is found that our results are in reasonable agreement with the experiment and lattice results, and in particular, our results suggest that the pion cloud contribution plays an indispensable role~\cite{Wang:2026nlr, Wang:2024abv}, especially for the magnetic moments and the D-term of the systems, and therefore the sign problem of the positive D-term in our previous model calculations with quark-diquark approach is solved~\cite{Wang:2023bjp, Fu:2023ijy}.

\begin{thebibliography}{99} \bibitem{Wang:2026nlr} Wang, Jiaqi and Fu, Dongyan and Dong, Yubing, "Form factors of $\Delta(1232)$ and the electromagnetic $N-\Delta$ transition", arXiv: 2602.19480.

\bibitem{Wang:2024abv} Wang, Jiaqi and Fu, Dongyan and Dong, Yubing, "A systematic study of nucleon form factors with the pion cloud effect", arXiv: 2410.14953; Eur. Phys. J. 85 1254 (2025).

\bibitem{Wang:2023bjp} Wang, JiaQi and Fu, Dongyan and Dong, Yubing, "Form factors of decuplet baryons in a covariant quark{\textendash}diquark approach", arXiv: 2311.07149; Eur. Phys. J. C84, 79 (2024).

\bibitem{Fu:2023ijy} Fu, Dongyan and Wang, JiaQi and Dong, Yubing, "Form factors of {\ensuremath{\Omega}}- in a covariant quark-diquark approach", arXiv: 2306.04869; Phys. Rev. D 108, 076023 (2023).

\end{thebibliography} \end{document}

Primary author(s) : Dr. WANG, Jiaqi (Institute of High Energy Physics, Chinese Academy of Sciences China); Dr. FU, Dongyan (Southern Center for Nuclear-Science Theory, Institute of Modern Physics, Chinese

Academy of Sciences); Prof. DONG, Yubing (Institute of High Energy Physics, Chinese Academy of Sciences, China)

Presenter(s) : Prof. DONG, Yubing (Institute of High Energy Physics, Chinese Academy of Sciences, China)

Session Classification : Poster session

Track Classification : High energy physics: theory