

Abstract Submitted
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NMR study of spin fluctuations and superconductivity in $\text{LaFeAsO}_{1-x}\text{H}_x$ ¹ NAOKI FUJIWARA, RYOSUKE SAKURAI, Graduate School of Human & Environmental Studies, Kyoto University, SOUSHI IIMURA, SATORU MATSUSHI, HIDEO HOSONO, Material and structures laboratory (MSL), Tokyo Institute of Technology, YOICHI YAMAKAWA, HIROSHI KONTANI, Department of Physics, Nagoya University and JST, TRIP — We have performed NMR measurements in $\text{LaFeAsO}_{1-x}\text{H}_x$, an isomorphic compound of $\text{LaFeAsO}_{1-x}\text{F}_x$. $\text{LaFeAsO}_{1-x}\text{H}_x$ is most recently known for having double superconducting (SC) domes on H doping. $\text{LaFeAsO}_{1-x}\text{H}_x$ is an electron-doped system, and protons act as H^{-1} as well as F^{-1} . The first SC dome is very similar between F and H doping, suggesting that H doping supplies the same amount of electrons as F doping. Interestingly, an excess amount of H up to $x=0.5$ can be replaced with O^{2-} . In the H-overdoped regime ($x > 0.2$), $\text{LaFeAsO}_{1-x}\text{H}_x$ undergoes the second superconducting state [1]. We measured the relaxation rate of $\text{LaFeAsO}_{1-x}\text{H}_x$ for $x=0.2$ and 0.4 , and found an anomalous electronic state; spin fluctuations measured from $1/T_1T$ is enhanced with increasing the doping level from $x = 0.2$ to 0.4 . The enhancement of spin fluctuations with increasing carrier doping is a new phenomenon that has not been observed in $\text{LaFeAsO}_{1-x}\text{F}_x$ in which the upper limit of the doping level is at most $x = 0.2$. We will discuss the phenomenon in relation to superconductivity.

[1] S. Iimura, *et.al.*, Nature Communications (2012)

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