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Unusual superconducting state in Pr-doped CaFe_2As_2
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Laboratory — We report the detection of unusual superconductivity
up to 49 K in Pr-doped single crystalline CaFe_2As_2 as evidenced from
the resistive, magnetic and thermoelectric measurements. This super-
conducting transition observed suggests the possible existence of two
phases: a field as low as 500 Oe can totally suppress the observed dia-
magnetic susceptibility above 21K. The 49 K part has a low critical field
< 4 Oe, and the other at 21K, with a high upper critical field > 5T.
Our observations are in strong contrast to previous reports of doping or
pressurizing layered compounds AeFe_2As_2 (Ae122), where Ae = Ca, Sr,
or Ba. In Ae 122, hole-doping has been previously observed to generate
superconductivity with a transition temperature (T_c) only up to 38 K
and pressurization has been reported to produce superconductivity with
a T_c up to 30 K. The experiment results of resistivity and inductance
measurements of Pr-doped Ca122 under pressure up to 2.0 GPa will also
be discussed.

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