EVOLUTION FROM INSULATOR (x=0.003) TO METAL (x=1) OF THE Eu^{2+} LOCAL ENVIRONMENT IN $Ca_{1-x}Eu_xB_6$

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CaB_6 is believed to be an insulator, while EuB_6 is a semimetal at higher T. Alloying these two systems should give rise to a metal-insulator transition. The local environment of Eu^{2+} ($4f^7$, S=7/2) in $Ca_{1-x}Eu_xB_6$ ($0.003 < x < 1.00$) is studied by means of electron spin resonance (ESR). For $x < 0.07$ the resonances have Lorentzian line shape, indicating an *insulating* environment for the Eu^{2+} ions. For $x > 0.07$, the lines broaden and become Dysonian in shape, suggesting a change to *metallic* environment for the Eu^{2+} ions, anticipating the *semimetallic* character of EuB_6. The broadening is attributed to a spin-flip scattering relaxation process due to the exchange interaction between conduction and Eu^{2+} 4f electrons. High field ESR measurements for $x > 0.30$ reveal narrower and anisotropic line widths, which are attributed to magnetic polarons and Fermi surface effects, respectively.