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> Referee 1

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> ...

> Content:

> Accept after minor changes

> submitted on Fri 20 Jun 2014 at 22:21

> Comments

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> Replace:

> "system because of two reasons." by "system for two reasons."

=> Done.

> Explain what UD detector pair means.

> Same for FB detector pair.

=> The explanation is given at the end of Section 2.

In the following text, "UD detector pair" is synonymous used for " μ spin \perp perpendicular c" and accordingly, "FB detector pair" is synonymous used for " μ spin \parallel c".

For a better readability at the end of Sec. 3.2., I added " μ spin \perp perpendicular c" and " μ spin \parallel c" in bracket once more.

> Replace "at the muon site to" by "at the muon site to be"

=> Done

> This calculation warrants a reference: "From the absolute asymmetry values,

> Vosc and PFB($t=0$) in the ordered ($T=1.6K$) and normal state ($T>150K$), we

> calculated the UD

> c-axis tilting angle of the local field at the muon site to 9(2)? at

> $T=1.6K$."

=> Done. The referee is welcome to ask me for the derivation which is readily available.

> Explain what Tet means in the upper part of Fig. 3.

=> Done.

> Criteria Evaluation

> Does the paper contain enough/significant new physics to warrant

> publication?: Agree

> Is the paper scientifically sound and not misleading?: Agree

> Is the paper well organized and clearly written?: Agree

> Are the subject matter and style of presentation appropriate?: Agree

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> Referee 2

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> ...

> Content:

> Accept after minor changes

> submitted on Fri 27 Jun 2014 at 15:40

> Comments

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> The article describes a study of the interplay between magnetism and

> superconductivity in a pnictide superconductor by muon spin rotation and

> Mossbauer spectroscopy.

> $\text{EuFe}_2(\text{As}_{1-x}\text{Px})_2$ is interesting because P is nominally isovalent to As and

> superconductivity is thus not introduced by extra charge carriers. In

> addition it contains the magnetic rare earth element Eu gives rise to

> magnetic order of the local Eu^{2+} 4f electrons on top of the more

> itinerant ordering of the iron 3d electrons.

>

> In the literature one finds conflicting results about the evolution of

> magnetism with P doping and no comprehensive

- > study exists about the evolution of magnetism in single crystalline
- > materials. The authors measured three samples with $x=0.13$ (non
- > superconducting), 0.19 (superconducting) and 0.28 (non
- > superconducting), but only the main results on the superconducting $x=0.19$
- > compound are presented in this article. The results on $x=0.13$ and 0.28
- > are mentioned without going into details and the reader is referred to
- > an article, which is in preparation.
- >
- > The main experimental findings are: A coexistence of magnetism and
- > superconductivity with a very gradual increase of the magnetic volume
- > fraction upon cooling. The local field is found to be oriented along the
- > c-axis, which points towards Fe moments lying in the ab plane,
- > consistent with the Mossbauer data.
- >
- > These results are of sufficient importance to warrant publication in the
- > present form.

- > Before publication the authors should consider the following changes:

- >
- > The phrase "we can in situ acquire the ZF time spectra..." should be
- > replaced by something like "we can simultaneously measure....."
- => Done.

- > The relaxation rate increases closely above T_{Sc} . There are unfortunately
- > no data points in the range from 30 K to 50 K to justify this statement.
- => This is true from the MuSR data alone.

The conclusion was made from a combination of the increase in the relaxation rate and the field distribution width in Mössbauer spectroscopy, which is direct comparable to an effective static field width on the MuSR time-scale.

Therefore, I changed "close to T_c " to "above T_c " in the correspondent sentence (4th sentence in Sec.4.4.)

- > $V_{mag}(50\%)$ is related to TSDW. This definition is completely arbitrary and
- > one should not draw strong conclusions from
- > the fact, that the fraction stays below 50 %.

=> The referee is right, that there is in no well-defined relation between phase transition temperatures as determined with macroscopic methods and microscopic probes in general to the best of my knowledge. Especially for heavily doped iron pnictides where the phase transition is so broad that it might be even considered to be a crossover. However, I do not consider the given definition as being completely arbitrary for two reasons. Firstly, associating $T_N (=T_{sdw})$ with 50% magnetic volume as measured by MuSR, Mössbauer spectroscopy or NMR is of common use in the field of substituted pnictides and has empirically shown to match many experimental data. And secondly, it can be motivated by the percolation threshold for a two-dimensional square lattice which is an approximate for the Fe-lattice within the so-called „FeAs-planes“.

Therefore, I added „percolation threshold“ in brackets within the sentences of the beforementioned definition. Anyhow, this definition is not crucial for our main experimental findings and the conclusion, so I am confident that the referee might agree with the revised version of this article.

- > Criteria Evaluation

- > Does the paper contain enough/significant new physics to warrant
- > publication?: Agree
- > Is the paper scientifically sound and not misleading?: Agree
- > Is the paper well organized and clearly written?: Weakly Agree
- > Are the subject matter and style of presentation appropriate?: Agree