MAR14-2013-020146

Abstract for an Invited Paper
for the MAR14 Meeting of
the American Physical Society

Superfluid ^{3}He in "nematically ordered" aerogel

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Liquid ^{3}He immersed in aerogel allows investigation of the influence of impurities on unconventional superfluidity. In most of such experiments silica aerogels are used. These aerogels consist of thin strands which form a "wisp." Although it is established that superfluid phases of ^{3}He in silica aerogels (A-like and B-like) have the same order parameters as A and B phases of bulk ^{3}He, many new phenomena were observed. In particular, it was found that global anisotropy of aerogel (e.g. caused by squeezing or stretching) can orient the order parameter. Depending on prehistory and on the type of the anisotropy the A-like phase may be homogeneous or in a state with random orbital part of the order parameter. Theory predicts that a large stretching anisotropy may even influence the order parameter structure: polar phase (or A phase with polar distortion), which are not realized in bulk ^{3}He, may become more favorable than pure A phase [1]. Large stretching anisotropy is hardly achievable in silica aerogel. Therefore in experiments described in the talk we used a new type of aerogel, consisting of $Al_2O_3 \cdot H_2O$ strands which are parallel to each other [2], i.e. this aerogel may be considered as infinitely stretched. We found that the superfluid phase diagram of ^{3}He in such "nematically ordered" aerogel is different from the case of ^{3}He in silica aerogel and that both observed A and B phases have large polar distortion. This distortion is larger at low pressures and grows on warming. There are indications that a pure polar phase appears near the superfluid transition temperature [3]. Recent results will be also presented.

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