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(POS-13) Ultrasound and Transport Measurements in the Weyl Semimetal NbP

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In recent years, physicists have discovered that the topological electronic structure of materials can have dramatic consequences on their properties. In a new variety of topological materials called Weyl semimetals, electrons behave as massless relativistic particles. These materials are in some sense a 3-dimensional equivalent to graphene. Many interesting magneto-electric effects, that could possibly be applicable to quantum technologies, have been predicted in Weyl semimetals and are still studied today. Theoretical and preliminary experiments have demonstrated that it is possible to probe the topological nature of these materials by measuring the speed at which acoustic waves travel through the material. This research technique allows us to probe the volume of the sample and to avoid certain errors associated with electrical conductivity measurements. In this project, we explore experimentally how the application of a magnetic field modifies the speed and absorption of sound in the Weyl semimetal NbP. We will show how applied magnetic fields have an anisotropic effect on the sound velocity and compare with previous results on the isostructural material TaAs. The sound velocity measurements also exhibit quantum oscillations that allow us to characterize the Fermi surface of the material. We have also carried out transport measurements on the same material NbP as a complementary measurement of quantum oscillations.

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