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Optically detected hyperfine splitting and optical nuclear-spin hyperpolarization of the ^{209}Bi donor in ^{nat}Si T. SEKIGUCHI, M. STEGER, A. YANG, K. SAEEDI, M.L.W. THEWALT, Dept. of Physics, Simon Fraser University, Burnaby, BC, Canada, H. RIEMANN, N.V. ABROSIMOV, N. NÖTZEL, Institute for Crystal Growth, Berlin, Germany — Among the group-V donors in silicon, bismuth (^{209}Bi) has by far the largest hyperfine constant due to its large binding energy. So far, however, there has been no attempt to see the hyperfine splitting in the Bi bound exciton transition. We show a well-resolved zero-field hyperfine splitting, and while the hyperfine splitting under magnetic field is not well resolved an optical hyperpolarization of the Bi nuclear spin ($I = 9/2$) is observed by studying the temperature dependence of the PL spectra. This nonresonant optical nuclear hyperpolarization is similar to one observed recently for ^{31}P using EPR, and we propose a new model for its origin.

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