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Observation of a Bound Exciton Transition in Ion-Beam Synthesized β-$FeSi_2$ A. GLEN BIRDWELL, FRANK J. CROWNE, TERRANCE P. O'REGAN, U.S. Army Research Laboratory, Adelphi, Maryland 20783, USA — Photoreflectance studies of β-$FeSi_2$ have revealed the presences of strong (direct) optical transitions together with several interesting lower-energy spectral features, including indirect gap excitonic transitions. In this presentation, we focus on one of these features made observable at low temperatures and located a few meV below the first direct gap. We attribute the origin of this feature to a transition that takes place on a bound exciton-ionized acceptor complex. Our observations of this transition together with results of our previous photoreflectance analysis lead us to identify it as the fundamental mechanism for the 1.5 μm light emission in β-$FeSi_2$. This result provides deeper insight into the light emission properties of β-$FeSi_2$.

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