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Quantum well structure for a test of intersubband plasma instability P. BAKSHI, C. DU, K. KEMPA, Boston College, T. ROCHELEAU, M. SHERWIN, A. GOSSARD, UCSB — We have shown theoretically that a resonant interaction of an intersubband plasmon emission mode with an absorption mode creates a plasma instability [1]. This can be tested experimentally in an asymmetric double quantum well where the lowest three levels, with appropriate occupancy, provide near resonant emission and absorption modes. The third level is to be partially populated by THz laser pumping from the first level. An applied bias tunes the second level in relation to the other two. The two modes attract each other to form a pair of complex conjugate modes, thus creating a plasma instability. Such a structure has been designed, grown and characterized through absorption measurements without pumping. The results are in good agreement with theory calculations. Narrow Lorentzian lineshapes are observed, indicating a low level of collisions. A realistic pumping fraction can produce sufficiently strong instability to overcome the collisional damping. Characteristic instability criteria, including a modified lineshape are predicted, to be tested with pumping in the next phase of the program. [1] P. Bakshi and K. Kempa, Cond. MatterTheories,12,399 (1997); 20,45 (2005); Physica E7,63 (2000).Work supported by ARO and NSF.

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