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Pseudogaps in $SrTiO_3$ Quantum Wells PATRICK MARSHALL, SANTOSH RAGHAVAN, EVGENY MIKHEEV, SUSANNE STEMMER, Univ of California - Santa Barbara — A departure from Fermi liquid behavior appears in molecular beam epitaxy grown $SrTiO_3$ quantum wells embedded in the antiferromagnetic insulator $SmTiO_3$, suggesting proximity to a quantum critical point. We will report on the observation of pseudogap behavior in $SmTiO_3/SrTiO_3/SmTiO_3$ quantum wells via tunneling spectroscopy measurements. Tunnel junction devices with $SrZrO_3$ barriers grown in-situ were fabricated from quantum wells of varying thickness. The tunneling conductance spectra of these devices revealed the formation of a pseudogap in the density of states upon cooling, indicating the onset of non-Fermi liquid behavior. The pseudogap state was most pronounced in thin quantum wells, persisting up to nearly 200 K in the well containing only 2 SrO layers. The pseudogap was absent in the thickest wells, which showed only a small suppression of the density of states with a logarithmic dependence on bias resulting from disorder. The results are compared to tunneling spectra of $GdTiO_3/SrTiO_3/GdTiO_3$ quantum wells, providing insight into the role of structural distortion and octahedral tilts on the electronic structure and quantum critical behavior in oxide heterostructures.

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