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The vanishing Janssen effect in a confined 2D granular system compressed by friction YASIN KARIM, ERIC CORWIN, Materials Science Institute and Department of Physics, University of Oregon — As described by H.A. Janssen in 1895, the pressure in a granular packing saturates above a certain filling height, determined by the particle-particle and particle-wall interactions. This effect has been studied extensively for 2D and 3D confined granular packs compressed by gravity. However, many industrially relevant processes involve the horizontal transport of granular materials by conveyor belts. In such a case gravity becomes irrelevant and the system is driven by frictional forces. We study horizontal 2D confined granular packs on a conveyor belt as they are driven into a stationary barrier. We measure the relationship between pressure and filling height and, surprisingly, find no saturation of pressure. Instead, we observe a linear relationship between pressure and filling height irrespective of the particle-wall coefficient of friction demonstrating that the Janssen effect is not relevant for such systems. However, we can recover a Janssen-like saturation if we replace the straight confining walls with a sawtooth pattern on the scale of the particle size. This allows for a mechanical transfer of load onto the walls and can be interpreted in terms of an effective mechanical "friction."

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