

Abstract Submitted  
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**Long-range Rydberg-Rydberg interactions at very-high  $n$** <sup>1</sup> R G  
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FER, Vienna University of Technology — Excitation of very-high- $n$  strontium Ryd-  
berg atoms under blockade conditions in an atomic beam provides an opportunity to  
study strongly-coupled Rydberg-Rydberg systems under controlled conditions. In  
the present work, blockade is exploited to create a string of Rydberg atoms with ap-  
proximately equal initial separations. Sudden application of an electric field “step”  
is then used to create Stark wave packets whose subsequent time evolution is moni-  
tored through ionization induced by a pulsed electric field. Measurements of the  
number of surviving Rydberg atoms reveal pronounced Stark quantum beats. Pre-  
liminary comparisons of the quantum beat behavior for single and multiple Rydberg  
atoms indicate that Rydberg-Rydberg interactions lead to dephasing and a reduc-  
tion in the amplitude of the (collective) beats. The mechanisms responsible for this  
are being examined through further experimental studies and through theoretical  
analysis.

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