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## Dynamics of molecular beams in a traveling-wave Stark decelerator

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Document Version Publisher's PDF, also known as Version of record

Publication date: 2019

Link to publication in University of Groningen/UMCG research database

Citation for published version (APA): Zapara, A. (2019). Dynamics of molecular beams in a traveling-wave Stark decelerator. [Thesis fully internal (DIV), University of Groningen]. University of Groningen.

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Download date: 13-02-2023

# **Propositions**

accompanying the dissertation

### Dynamics of molecular beams in a traveling-wave Stark decelerator

by

#### Artem Zapara

- 1. In order to double the effective energy scale probed by a low-energy experiment of the electron EDM, one has to quadruple the total statistics. Presently, achieving the same goal in a high-energy experiment necessitates development of new particle acceleration technologies.
- 2. Examination of heavy molecules with high-precision spectroscopy connects phenomena at fundamentally different scales: from the size of elementary particles ( $10^{-15}$  m) to that of the observable universe ( $10^{27}$  m).
- 3. For a molecule in a Stark decelerator, the internal state dynamics is largely governed by the rotation rate of the electric field.
- 4. The same Monte-Carlo algorithm used to approximately determine  $\pi$  can also be applied to calculate the phase-space acceptance of a decelerator.
- 5. Searching for a molecular signal in a noisy background with laser-induced fluorescence is analogous to looking for a black cat in a dark room: it is quite difficult to find, especially when there is no cat.
- 6. The concept of a nonadiabatic transition encompasses the mutability of processes in physics, biology and even in the social disciplines such as economics.
- 7. Having a good sense of smell can be vital in saving expensive laboratory equipment from total failure.
- 8. To satisfy a substantial public demand, every academic researcher should popularize science.