

# Atomic Collapse in Graphene: Lost of Unitarity

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**Alfredo Raya**<sup>1</sup>

David Valenzuela<sup>2</sup>, Marcelo Loewe<sup>2</sup>, Saúl Hernández-Ortiz<sup>1</sup>

<sup>1</sup>*Instituto de Física y Matemáticas, Universidad Michoacana de San Nicolás de Hidalgo, Edificio C-3, Ciudad Universitaria, CP58040, Morelia Michoacán México*

<sup>2</sup>*Instituto de Física, Pontificia Universidad Católica de Chile, Casilla 302, Santiago 22, Chile*

[raya@ifm.umich.mx](mailto:raya@ifm.umich.mx)

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## Abstract

We review the problem of atomic collapse in graphene due to electric impurities within the context of supersymmetric quantum mechanics. Experimentally, formation of resonances around artificial nuclei formed by clusters of calcium dimmers have been observed [1]. We model impurities by strong Coulomb potential in the corresponding Dirac equation. Upon factorizing the radial Hamiltonian and identifying the supercharges, there is a critical charge, in agreement with experiments, that makes the ground state fall into the center, translating into loss of Hermiticity for the corresponding Hamiltonian -which in the language of supersymmetric quantum mechanics means that the superpotential is a purely imaginary function- and hence loss of unitarity of the theory followed by the non-preservation of probabilities [2].

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## References

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