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2

Searching for a topic

Use the "Document search" tab (default)

The screenshot shows the Scopus search interface. At the top, there is a navigation bar with 'Scopus' on the left and 'Search', 'Sources', 'Alerts', 'Lists', 'Help', 'SciVal', 'Register', and 'Login' on the right. Below this is a dark blue header with 'Document search' in white text, and a 'Compare sources' link on the right. Underneath, there are tabs for 'Documents', 'Authors', 'Affiliations', and 'Advanced'. The 'Documents' tab is selected. The search area contains a search bar with the text 'superconductivity AND "broken symmetry"' and a dropdown menu set to 'Article title, Abstract, Keywords'. Below the search bar are two 'AND' sections, each with a 'Search' input field and a dropdown menu set to 'Article title, Abstract, Keywords'. At the bottom, there is a '> Limit' link, a 'Reset form' button, and a 'Search Q' button. A red arrow points from the text 'Use the "Document search" tab (default)' to the 'Document search' tab.

3

Searching for a topic

Type in key words

This screenshot is identical to the one above, showing the Scopus search interface. However, a red arrow points from the text 'Type in key words' to the search input field containing the text 'superconductivity AND "broken symmetry"'. The rest of the interface, including the navigation bar, tabs, and buttons, is the same as in the previous image.

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Searching for a topic

Use the drop-down menus to specify where to search

The screenshot shows the Scopus search interface. At the top, there are navigation links: Search, Sources, Alerts, Lists, Help, SciVal, Register, and Login. Below this is a 'Document search' header with a 'Compare sources' link. The main search area has tabs for Documents, Authors, Affiliations, and Advanced. A search bar contains the text 'superconductivity AND "broken symmetry"' with a search type dropdown set to 'Article title, Abstract, Keywords'. Below the search bar are three 'AND' search sections, each with a search input field and a search type dropdown set to 'Article title, Abstract, Keywords'. At the bottom left, there is a '> Limit' link. A red arrow points from the text 'Use the drop-down menus to specify where to search' to the search type dropdown menu in the first search section.

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Searching for a topic

The screenshot shows the Scopus search interface, similar to the previous one. The search bar contains the same text. Below the search bar are three 'AND' search sections. At the bottom left, the '> Limit' link is circled in red. A red arrow points from the text 'Use the "Limit" link to specify a date range' to the circled link. Below the 'Limit' link, there are options for 'Date range (inclusive)'. The first option is 'Published All years' with a dropdown set to 'Present'. The second option is 'Added to Scopus in the last 7 days'. Below these are options for 'Document type' (set to 'ALL') and 'Access type' (set to 'All').

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Searching for a topic

The screenshot shows the Scopus search interface with the search term "superconductivity AND 'broken symmetry'". The interface includes a search bar, a "Limit" link circled in red, and a date range filter set to "Published" from "All years" to "Present". Red arrows point to the "Limit" link with the text "Use the 'Limit' link to specify a date range" and to the "Document type" and "Access type" filters with the text "or document or access type (open access)".

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Results can be refined by many search parameters

The screenshot shows the Scopus search results page for the same search term, displaying 164 document results. The page includes a "Refine results" sidebar with filters for "Access type", "Year", and "Author name". Red arrows point to the "Limit or Exclude" link, the "by access type" filter, and the "by year" filter. A table of results is visible, showing document titles, authors, years, and sources.

Document title	Authors	Year	Source	Cited by
1 Evidence of cosmic strings by the observation of the alignment of quasar polarization axes on Mpc scale	Singler, R.J.	2018	International journal of Modern Physics D 27(5),1850094	0
2 Quantum Multicriticality near the Dirac-Semimetal to Band-Insulator Critical Point in Two Dimensions: A Controlled Ascent from One Dimension	Roy, B., Foster, M.S.	2018	Physical Review X 8(1),011049	2
3 Two-stage multipolar ordering in PrTl2Al20 Kondo materials	Freyer, F., Altig, J., Lee, S., (...), Trebst, S., Kim, Y.B.	2018	Physical Review B 97(11),115111	0
4 Magnetic and Nematic Orders of the Two-Dimensional Electron Gas at Oxide (111) Surfaces and Interfaces	Boudjada, N., Wachtel, G., Paramakanti, A.	2018	Physical Review Letters 120(8),086802	2

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Results can be automatically analyzed by clicking the link

The screenshot shows the Scopus search results page. At the top, there's a navigation bar with 'Search', 'Sources', 'Alerts', 'Lists', 'Help', 'SciVal', 'Register', and 'Login'. Below that, a blue banner indicates '164 document results'. The search criteria are 'TITLE-ABS-KEY (superconductivity AND "broken symmetry")'. A red arrow points to the 'Analyze search results' link in the top right of the results area. Below the search bar, there are options to 'Refine results' by 'Access type', 'Year', and 'Author name'. The main results table shows four entries with columns for 'Document title', 'Authors', 'Year', 'Source', and 'Cited by'.

Document title	Authors	Year	Source	Cited by
Evidence of cosmic strings by the observation of the alignment of quasar polarization axes on Mpc scale	Slagter, R.J.	2016	International Journal of Modern Physics D 27(9),1850094	0
Quantum Multicriticality near the Dirac-Semimetal to Band-Insulator Critical Point in Two Dimensions: A Controlled Ascent from One Dimension	Roy, B., Foster, M.S.	2018	Physical Review X 8(1),011049	2
Two-stage multipolar ordering in PrT2Al2O Kondo materials	Freyer, E., Atsig, J., Lee, S., C., Trebst, S., Kim, Y.B.	2018	Physical Review B 97(11),115111	0
Magnetic and Nematic Orders of the Two-Dimensional Electron Gas at Oxide (111) Surfaces and Interfaces	Boudjada, N., Wachtel, G., Paramakanti, A.	2018	Physical Review Letters 120(9),096802	2

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And Scopus will analyze the results in many different ways

The screenshot shows the Scopus search results page with various analysis options. The search criteria are 'TITLE-ABS-KEY (superconductivity AND "broken symmetry")'. The main results table is visible. Below the table, there are several analysis options: 'by affiliation', 'by year', 'by source', 'by author', 'by country', 'by doc type', and 'by subject'. Each option is represented by a small icon and a label.

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Click on the title in the "results" list

Scopus Search Sources Alerts Lists Help SciVal Register Login

164 document results

TITLE-ABS-KEY (superconductivity AND "broken symmetry")

Search within results... Analyze search results Show all abstracts Sort on: Date (newest)

Refine results: Limit to Exclude Access type Year

Document title	Authors	Year	Source	Cited by
1 Evidence of cosmic strings by the alignment of quasar polarization axes on Mpc scale	Shuster, R.J.	2018	International Journal of Modern Physics D 27(9),1850094	0
2 Quantum Multicriticality near the Dirac-Semimetal to Band-Insulator Critical Point in Two Dimensions: A Controlled Ascent from One Dimension	Roy, B., Foster, M.S.	2018	Physical Review X 8(1),011049	2

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Abstract, metrics, citing docs, related docs, keywords, all references

Scopus Search Sources Alerts Lists Help SciVal Register Login

Document details

Physical Review X Open Access Volume 8, Issue 1, 26 March 2018, Article number 011049

Quantum Multicriticality near the Dirac-Semimetal to Band-Insulator Critical Point in Two Dimensions: A Controlled Ascent from One Dimension

Roy, B., Foster, M.S.¹

¹Department of Physics and Astronomy, Rice University, Houston, TX 77005, United States

²Rice Center for Quantum Materials, Rice University, Houston, TX 77005, United States

Abstract

We compute the effects of generic short-range interactions on gapless electrons residing at the quantum critical point separating a two-dimensional Dirac semimetal and a symmetry-preserving band insulator. The electronic dispersion at the critical point is anisotropic [D=2v₁(k₁²+k₂²) with v₁>v₂] which results in unconventional scaling of thermodynamic and transport quantities. Because of the vanishing density of states E⁻¹(E-E_C), the anisotropic semimetal (ASM) is stable against weak short-range interactions. However, for stronger interactions, the direct Dirac-semimetal to band-insulator transition can either (i) become a fluctuation-driven first-order transition (although unlikely in a particular microscopic model considered here, the anisotropic honeycomb lattice extended Hubbard model) or (ii) get avoided by an intervening broken-symmetry phase. We perform a controlled renormalization group analysis with the small parameter G/L, augmented with a 1/G expansion (parametrically suppressing quantum fluctuations in the higher dimension) by participating away from the one-dimensional limit, realized by setting G=0 and n=3. We identify charge density wave (CDW), antiferromagnet (AFM), and dimer-*n*-swave **superconductivity** as the three dominant candidates for **broken symmetry**. The onset of any such order at strong coupling (-G) takes place through a continuous quantum phase transition across an interacting multicritical point, where the ordered phase, band insulator, Dirac, and anisotropic semimetals meet. We also present the phase diagram of an extended Hubbard model for the ASM, obtained via the controlled deformation of its counterpart in one dimension. The latter displays spin-charge separation and instability to CDW, spin density wave, and Luther-Emery liquid phases at arbitrarily weak coupling. The spin density wave and Luther-Emery liquid phases deform into pseudospin SU(2)-symmetric quantum critical points separating the ASM from the AFM and superconducting orders, respectively. Our phase diagram shows an intriguing interplay among CDW, AFM, and *n*-wave paired states that can be germane for a uniaxially strained optical honeycomb lattice for ultracold fermion atoms, or the organic compound θ-(BEDT-TTF)₂I₃. © 2018 authors. Published by the American Physical Society.

Reaxys Database Information

Indexed keywords

Engineering controlled terms: Anisotropy, Charge density, Charge density waves, Coupling, Density optical, Honeycomb structures, Hubbard model, Metals, Optical lattices, Phase diagrams, Quantum electronics, Separation, Spin waves, Spin density wave, Statistical mechanics

Metrics: 2 Citations in Scopus, 4.92 Field-Weighted Citation Impact

link for citing docs

Cited by 2 documents

Phase transition with trivial quantum criticality in an anisotropic Weyl semimetal
Li, X., Wang, J.-R., Liu, G.-Z., (2018) Physical Review B

Inherent quantum multicriticality of two-dimensional Dirac fermions
Roy, B., Goswami, P., Jun62, V., (2018) Physical Review B

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Physical Review X Open Access
Volume 8, Issue 1, 26 March 2018, Article number 011049

Quantum Multicriticality near the Dirac-Semimetal to Band-Insulator Critical Point in Two Dimensions: A Controlled Ascent from One Dimension

Roy, B., Foster, M.S.F. X

¹Department of Physics and Astronomy, Rice University, Houston, TX 77005, United States
²Rice Center for Quantum Materials, Rice University, Houston, TX 77005, United States

Abstract We compute the effects of generic short-range interactions on gapless electrons residing at the quantum critical point separating a two-dimensional Dirac semimetal and a symmetry-preserving band insulator. The electronic dispersion at this critical point is anisotropic ($E_{\text{Dirac}} = v_x k_x + v_y k_y$ with $v_x \neq v_y$), which results in unconventional scaling of thermodynamic and transport quantities. Because of the vanishing density of states $\rho(E) \sim |E|^{1/n}$, this anisotropic semimetal (ASM) is stable against weak short-range interactions. However, for stronger interactions, the direct Dirac-semimetal to band-insulator transition can either (i) become a fluctuation-driven first-order transition (although unlikely) in a particular microscopic model considered here, the anisotropic honeycomb lattice extended Hubbard model) or (ii) get avoided by an intervening broken-symmetry phase. We perform a controlled renormalization group analysis with the small parameter $\epsilon = 1/n$, augmented with a $1/n$ expansion (parametrically suppressing quantum fluctuations in the higher dimension) by perturbing away from the one-dimensional limit, realized by setting $\epsilon = 0$ and $n \rightarrow \infty$. We identify charge density wave (CDW), antiferromagnet (AFM), and single k -wave superconductivity as the three dominant candidates for broken symmetry. The onset of any such order at strong coupling ($\epsilon = 0$) takes place through a continuous quantum phase transition across an interacting multicritical point, where the ordered phase, band insulator, Dirac, and anisotropic semimetal meet. We also present the phase diagram of an extended Hubbard model for the ASM, obtained via the controlled deformation of its counterpart in one dimension. The latter displays spin-charge separation and instabilities to CDW, spin density wave, and Luther-Emery liquid phases at arbitrarily weak coupling. The spin density wave and Luther-Emery liquid phases deform into pseudospin SU(2) symmetric quantum critical points separating the ASM from the AFM and superconducting orders, respectively. Our phase diagram shows an intriguing interplay among CDW, AFM, and n -wave paired states that can be germane for a uniaxially strained optical honeycomb lattice for ultracold fermion atoms, or the organic compound Θ -BEDT-TTF₂. © 2018 Authors. Published by the American Physical Society.

Reaxys Database Information
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Indexed keywords
Engineering controlled terms: [Anisotropy](#) [Charge density](#) [Charge density wave](#) [Conduction](#) [Density \(optical\)](#) [Honeycomb structure](#) [Hubbard model](#) [Metalloids](#) [Optical lattices](#) [Phase diagrams](#)
[Quantum electron](#) [Separation](#) [Spin wave](#) [Spin density wave](#) [Statistical mechanics](#)

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Phase transition with trivial quantum criticality in an anisotropic Weyl semimetal
Lu, X., Wang, J.-R., Liu, G.-Z. (2018) Physical Review B
Itinerant quantum multicriticality of two-dimensional Dirac fermions
Roy, B., Goswami, P., Jun62, V. (2018) Physical Review B
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Quantum Multicriticality near the Dirac-Semimetal to Band-Insulator Critical Point in Two Dimensions: A Controlled Ascent from One Dimension

Bitan Roy and Matthew S. Foster
Phys. Rev. X **8**, 011049 – Published 26 March 2018

Article References Citing Articles (2) PDF HTML Export Citation

ABSTRACT

We compute the effects of generic short-range interactions on gapless electrons residing at the quantum critical point separating a two-dimensional Dirac semimetal and a symmetry-preserving band insulator. The electronic dispersion at this critical point is anisotropic ($E_{\text{Dirac}} = \pm \sqrt{v_x^2 k_x^2 + v_y^2 k_y^2}$ with $v_x \neq v_y$), which results in unconventional scaling of thermodynamic and transport quantities. Because of the vanishing density of states $\rho(E) \sim |E|^{1/n}$, this anisotropic semimetal (ASM) is stable against weak short-range interactions. However, for stronger interactions, the direct Dirac-semimetal to band-insulator transition can either (i) become a fluctuation-driven first-order transition (although unlikely in a particular microscopic model considered here, the anisotropic honeycomb lattice extended Hubbard model) or (ii) get avoided by an intervening broken-symmetry phase. We perform a controlled renormalization group analysis with the small parameter $\epsilon = 1/n$, augmented with a $1/n$ expansion (parametrically suppressing quantum fluctuations in the higher dimension) by perturbing away from the one-dimensional limit, realized by setting $\epsilon = 0$ and $n \rightarrow \infty$. We identify charge density wave (CDW),

Issue
Vol. 8, Iss. 1 — January - March 2018

Subject Areas
Condensed Matter Physics
Strongly Correlated Materials

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You can also search by author

Use the "Author search"

The screenshot shows the Scopus Author search interface. At the top, the Scopus logo is on the left, and navigation links for Search, Sources, Alerts, Lists, Help, and SciVal are on the right. Below the navigation bar is a blue header with 'Author search' and a 'Compare sources' link. A blue information box explains the Scopus Author Identifier algorithm. Below this is a tabbed interface with 'Documents', 'Authors', 'Affiliations', and 'Advanced'. The 'Authors' tab is circled in red. Below the tabs are input fields for 'Author last name' (with example 'e.g. Smith'), 'Author first name' (with example 'e.g. J.L.'), and 'Affiliation' (with example 'e.g. University of Toronto'). There is a 'Search Q' button and a checkbox for 'Show exact matches only'. At the bottom, there is an ORCID field with a 'Search Q' button.

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You can also search by author

Type in author surname and first name or initials

This screenshot is identical to the previous one, but the 'Author last name' field contains the text 'Fradkin' and the 'Author first name' field contains 'Eduardo'. Red arrows point from the text 'Type in author surname and first name or initials' to these two input fields.

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You can also search by author

Turn on "exact matches" to narrow search

The screenshot shows the Scopus Author search page. The 'Authors' tab is selected. The search criteria are: Author last name: Fradkin; Author first name: Eduardo. The 'Show exact matches only' checkbox is checked. A red arrow points from the text 'Turn on "exact matches" to narrow search' to the checkbox.

19

You can also search by author

Leave "Affiliation" blank for more results

The screenshot shows the Scopus Author search page. The 'Authors' tab is selected. The search criteria are: Author last name: Fradkin; Author first name: Eduardo. The 'Affiliation' field is blank. A red arrow points from the text 'Leave "Affiliation" blank for more results' to the blank field.

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Select the correct author...

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2 author results About Scopus Author Identifier

Author last name "Fradkin", Author first name "Eduardo"

Show exact matches only

Refine results

Limit to Exclude

Source title

- Journal Of Statistical Mechanics Theory And Experiment (2)
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Author	Documents	Subject area	Affiliation	City	Country/Territory
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2 Fradkin, Eduardo	1	Mathematics ; Physics and Astronomy ; Decision Sciences ; ...	University of Illinois at Urbana-Champaign	Urbana	United States

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21

And we get Eduardo's 226 papers

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226 document results View secondary documents

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2 Pair density waves in superconducting vortex halos	Wang, Y., Edkins, S.D., Hamidian, M.H., (-), Fradkin, E., Kivelson, S.A.	2018	Physical Review B 97(17):174510	5

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Year




- 2018 (6)
- 2017 (14)
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	Document title	Authors	Year	Source
1	Scrambling in the quantum Lifshitz model	Plamadeala, E., Fradkin, E.	2018	Journal of Statistical Mechanics: Theory and Experiment 2018(6),063102
2	Pair density waves in superconducting vortex halos	Wang, Y., Edkins, S.D., Hamidian, M.H., (...), Fradkin, E., Kivelson, S.A.	2018	Physical Review B 97(17),174510
3	Loop models, modular invariance, and three-dimensional bosonization	Goldman, H., Fradkin, E.	2018	Physical Review B 97(19),195112

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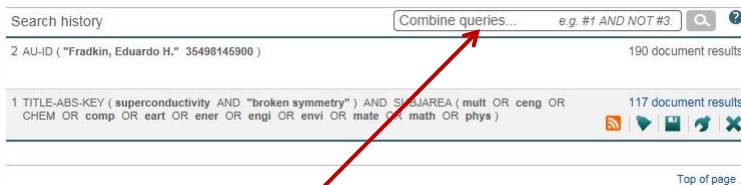
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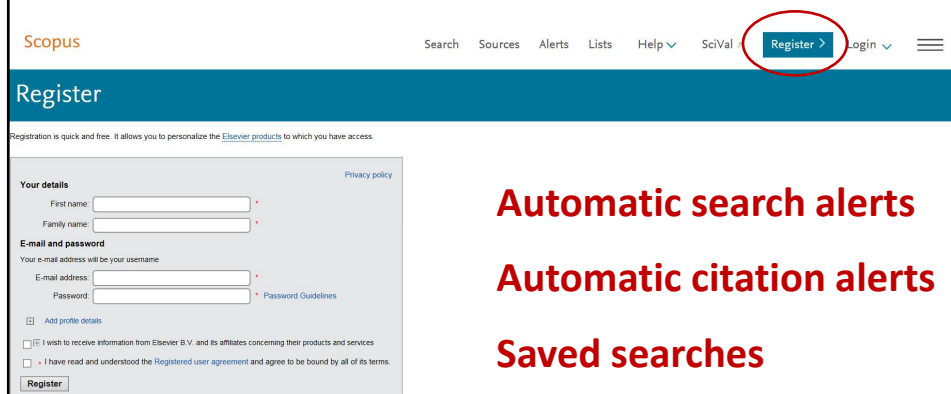
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which can be combined

25

Free registration gives access to additional services



Automatic search alerts

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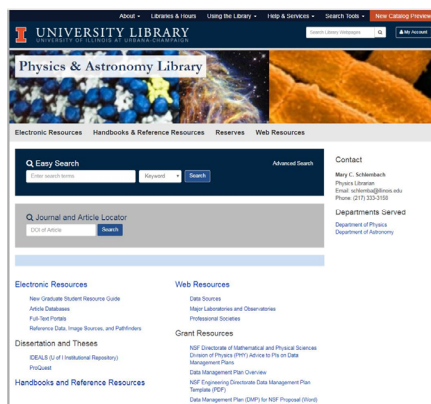
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