

Experiments and questions on hyperconductivity and quodons

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Formerly
Group leader, Rutherford High Energy
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Virtual Talk on September 27, 2019

Closing Lecture: Seminar G0.81, ETSII, at 12h

**JSLoc 2019: Japanese-Spanish Symposium on
Energy Localization in Nonlinear Lattices.**

Sevilla, September 23-28, 2019



Mike Russell in his laboratory in 2011 when he celebrated his 80th birthday.

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Research interests
Strongly correlated systems
Superconductivity
Department of Applied Physics
University of Huddersfield, UK



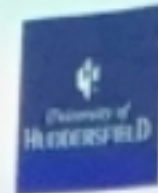
Currents
Large water-soluble high-Tc superconductors
Laboratory, India, etc.



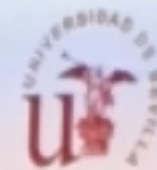
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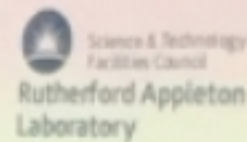
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fb
Dynamics

Recent Publications

- **Rare cosmological events recorded in muscovite mica, FM Russell, [arXiv:1902.00354](#) [astro-ph.HE] (2019)**
- *Hyperconductivity in fluorophlogopite at 300 K and 1.1 T.* FM Russell, MW Russell, JFR Archilla. EPL 127,1 (2019) 16001
- *Transport Properties of Quodons in Muscovite and Prediction of Hyper-Conductivity,* FM Russell, in *Nonlinear Systems, Vol. 2.* Springer (2018) 241
- *Infinite charge mobility in muscovite at 300K.* FM Russell, JFR Archilla, F Frutos, S Medina-Carrasco. EPL 120 (2017) 46001
- *On the charge of quodons,* JFR Archilla and FM Russell, *Letters on Materials* 6 (2016) 3
- *Tracks in Mica, 50 Years Later: Review of Evidence for Recording the Tracks of Charged Particles and Mobile Lattice Excitations in Muscovite Mica.* FM Russell, *Springer Ser. Mater. Sci.* 221 (2015) 3
- *I Saw a Crystal: An Historical Account of the Deciphering of the Markings in Mica.* FM Russell, *Springer Ser. Mater. Sci.* 221 (2015) 475
- **Charge coupling to anharmonic lattice excitations in a layered crystal at 800K, FM Russell, [arXiv:1505.03185](#) [cond-mat.supr-con] (2015)**

マイクからのご挨拶

Greetings from Mike.

- 非線形トピックについて話し合う楽しい時間を過ごしてください。
- ここでは、夜に目を覚まし続けるいくつかのトピックがあります。
- 実用的なHCケーブルを開発する手助けが必要です。
- I hope you have an enjoyable time discussing non-linear topics.
- Here are some topics that keep me awake at night.
- I need help to develop a practical HC cable.



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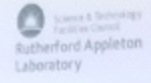
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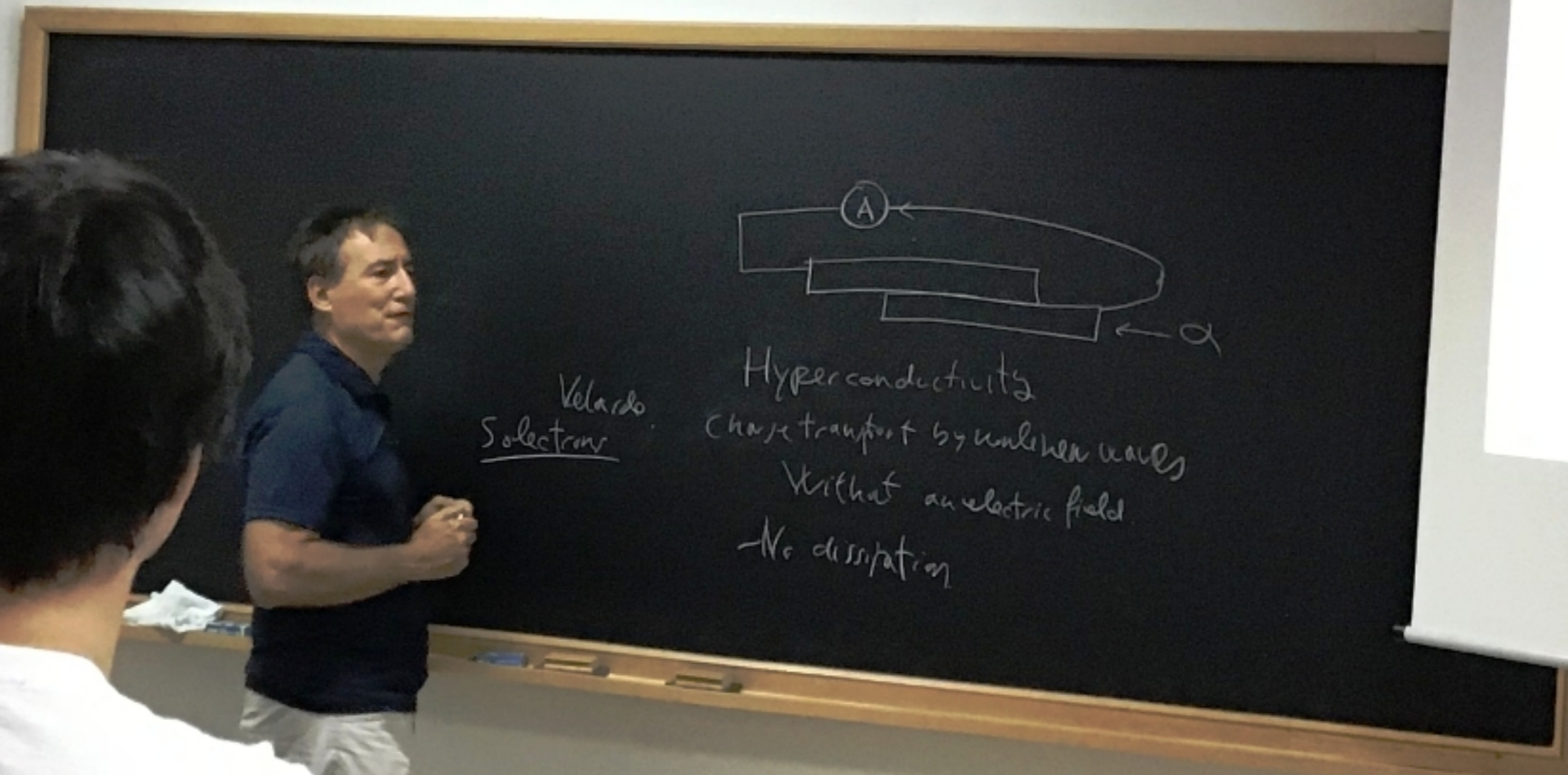
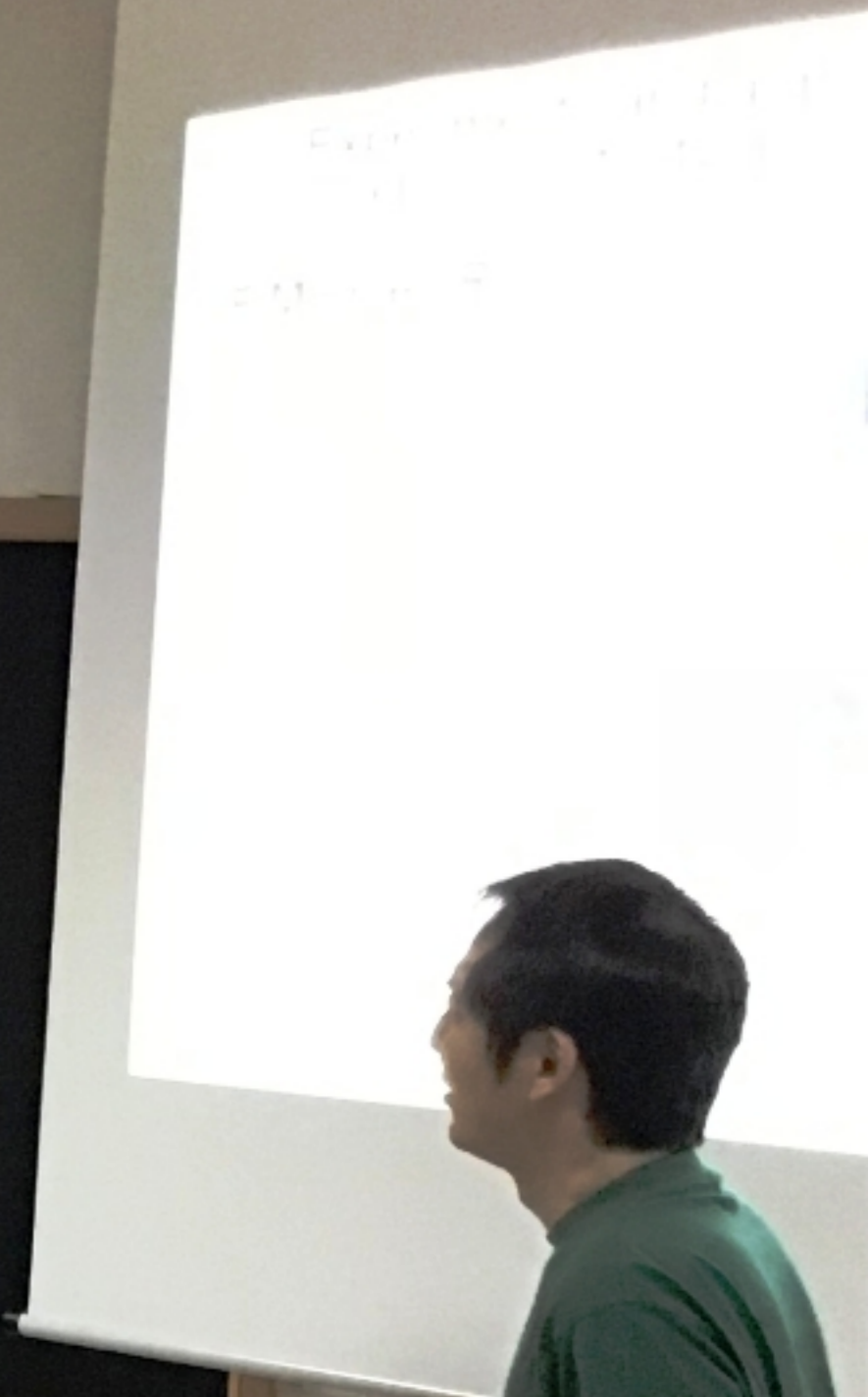


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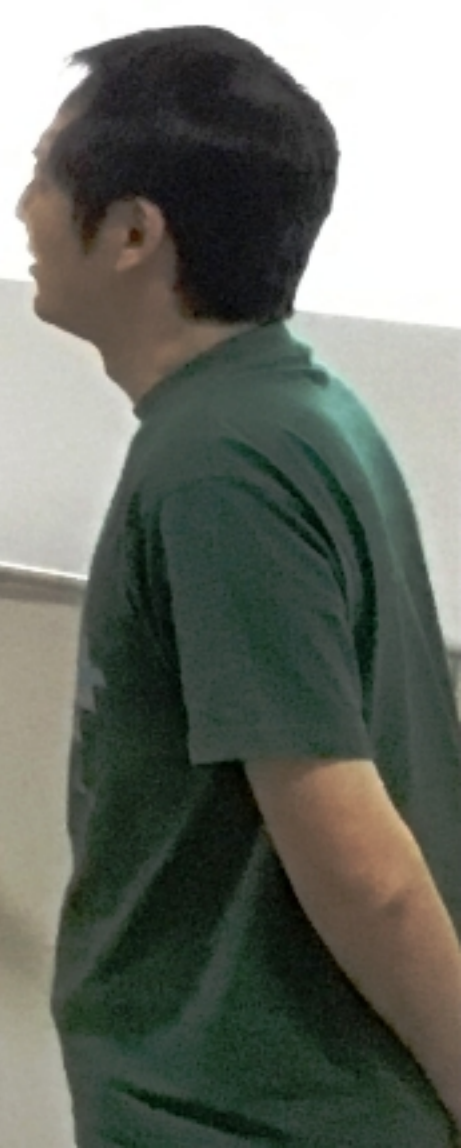
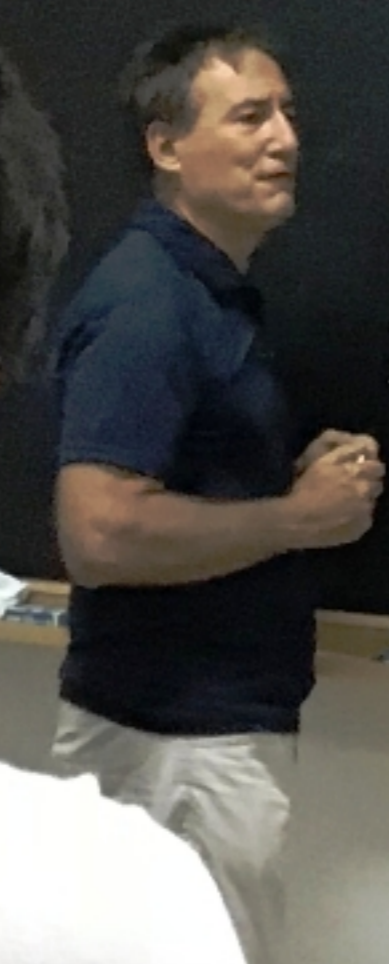
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Materials



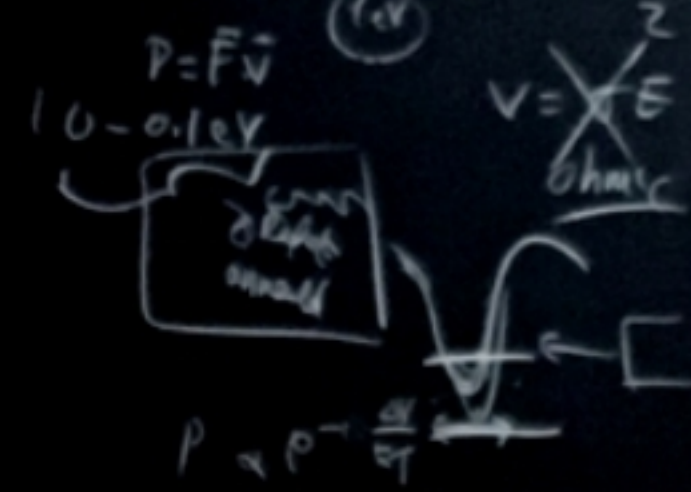
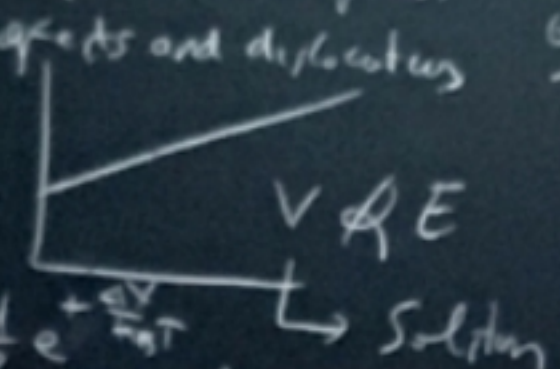
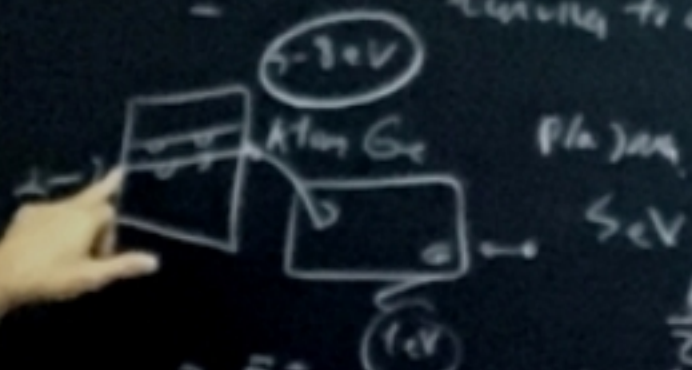


Velardo
Solectron

Hyperconductivity
Charge transport by undamped waves
Without an electric field
- No dissipation



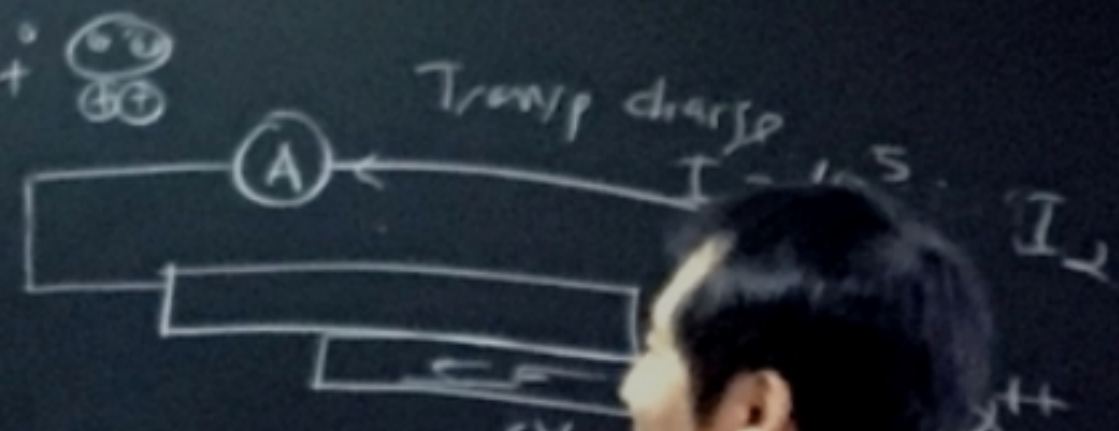
- Charge transport without \vec{E} : No dissipation
 - reasons: to defects and dislocations



$v = \frac{1}{2} e \frac{eV}{k_B T}$
 $0.026 \text{ eV} / k_B T$
 10%
 $v = \frac{1}{2} E$
 Ohmic

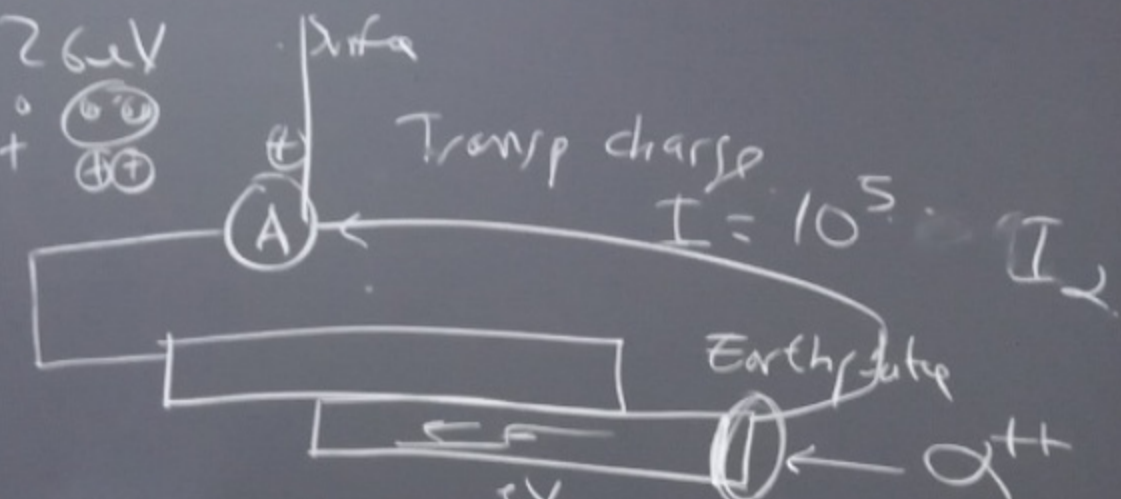
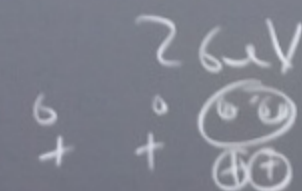
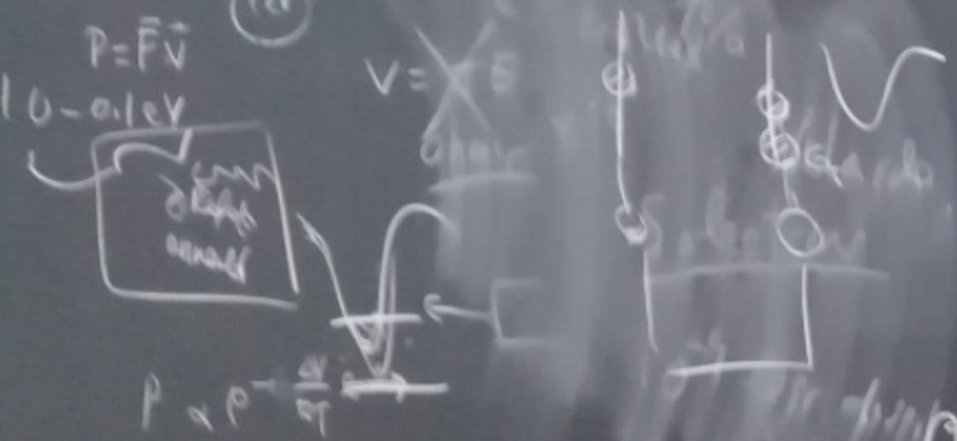
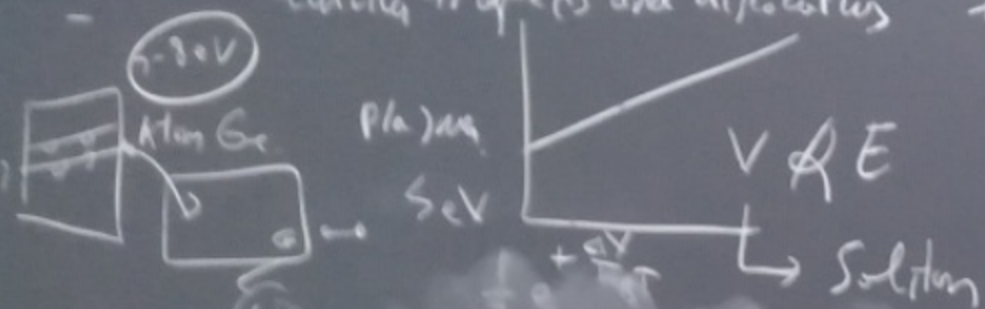
Soliton
 Velardo

10^{-9} loss dissipation

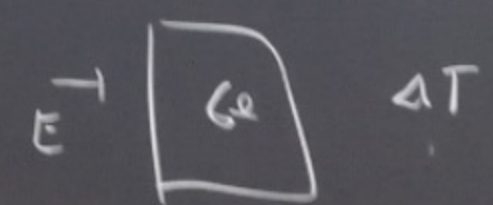


Hyperconductivity
 Charge transport by unbroken
 Without an electric field
 No dissipation

- Charge transport without \vec{E} : No dissipation
 - running to defects and dislocations



Hyperconductivity
 charge transport by undeha waves
 Without an electric field.
 No dissipation



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