Stripe melting and quantum criticality in correlated metals
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In the last several years evidence for the occurrence of stripe and related orders
has accumulated in many underdoped cuprates. With increasing doping the stripe
ordering tendency disappears. This has given rise to the idea that a stripe melting
quantum phase transition in the “underlying normal state” may play a role in some
of the physics of the optimally doped strange metal. However there is currently no
controlled understanding of a stripe-disordering phase transition in the presence of
a Fermi-surface of electrons. We obtain a controlled critical theory of a continuous
melting transition of charge stripes in a metal by proliferating pairs of dislocations
in the stripe-order parameter, without proliferating single dislocations. At such a
(deconfined) quantum critical point (QCP) the fluctuations of the stripe order pa-
rameter are strongly coupled, yet tractable. They also decouple dynamically from
the Fermi-surface. We find that the full Fermi-surface and the associated Landau
quasiparticles remain sharply defined at the QCP. On the stripe ordered side the
reconstruction of the Fermi surface occurs at an energy scale that is parametrically
different from that associated with the onset of stripe order.

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