Abstract Submission

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\nofiles
\MeetingID{MAR13}
%\DateSubmitted{20121109}
\LogNumber{MAR13-2012-006253}
\SubmittingMemberSurname{Grant}
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Technologies}
\PresentationType{oral}
\SortCategory{05.15}{}{}{}
\received{09
Nov 2012}
\begin{document}
\Title{Possibilities for Observation of Quantum
Transport in  (RE)Ba$_{\mathrm{2}}$Cu$_{\mathrm{3}}$O$_{\mathrm{7-y}}$
Perovskites}
\AuthorSurname{Grant}
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Technologies}
\CategoryType{C}
\begin{abstract}
For y $\approx $ 0, the crystal
structure of the ``1-2-3'' family of rare
earth copper oxide perovskites displays several curious ``porosity''
features. For example, along the b-axis direction of the region usually
termed the ``CuO chains,'' one observes a dramatically wide
``channel''
bounded within a Ba-Cu-O tube. Similar channels can be found in both the b-
and a-axes directions contained within RE, Cu and O ion groupings. The
cross-sectional area of these channels is roughly that of a single-wall
carbon nanotube, suggesting the former may manifest Buettiker-Landauer
quantum conductance similar to that observed in the latter. Moreover, by
employing various ratios of Pr/Y for the RE component of the host system,
the bulk electrical properties of the surrounding host can be tailored from
completely insulating to metallic. We test our conjecture predicting
ballistic transport down these channels using density functional theory and
report our initial findings here along with the likely consequences of
paramagnetic spin scattering. We also discuss possible experimental
embodiments which could lead to nano-controllable gate
structures.
\end{abstract}
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