Mature common beech trees are among the species that can improve urban quality.

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Ozone-reducing urban plants: Choose carefully

Ozone (O_3) pollution is a threat to human health, vegetation, biodiversity, and climate (*1*). Millions of urban citizens face O_3 levels above the World Health Organization standards, leading to nearly 150,000 deaths worldwide in 2019 (*2*). By 2050, 70% of the world population will reside in cities (*3*). Policies are urgently needed to reduce O_3 levels and prevent further deaths. Urban plants are one promising strategy (*4*).

Plants can reduce air pollution by adsorbing pollutants on their surfaces or absorbing them through their leaves or needles (*5*). Green urban infrastructure can mitigate O_3 pollution, and mature urban trees show higher O_3-removal capacity than, for example, green roofs, shrubs, or green walls (*6*). However, not all trees are the same—to maximize benefits, tree species should be selected based on their O_3-removal capacity. Top O_3-reducing tree species include common beech, small- and large-leaved lime, London plane, sycamore maple, Norway maple, tulip tree, horse chestnut, and turkey oak (*6*, *7*). Conversely, some species form more O_3 than they remove, such as blue gum, Italian and pubescent oak, spruce, hazel pine, weeping willow, and common myrtle (*6*, *7*). Generally, broadleaf tree species remove more O_3 than conifers (*8*). Worldwide urban greening programs should make sure to select species that improve air quality.

To maximize green O_3 removal, urban strategies should also consider environmental conditions such as meteorology, soil, and air quality and select the species best adapted to the region. Every region should find O_3-reducing species that are also long lived and low maintenance, with the greatest total leaf area possible. Although planting trees will not be able to counterbalance all anthropogenic O_3 pollution, choosing the right species can maximize the benefits of this valuable air quality strategy.

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Climate change threatens Pakistan's snow leopards

The snow leopard (*Panthera uncia*) population currently spans the mountainous regions of 12 countries, including more than 80,000 square kilometers in northern Pakistan (*1*). As a result of human encroachment and hunting, snow leopards are classified as Vulnerable (*2*). Climate change is exacerbating the threats the snow leopard already faces as well as transforming their environment in ways that make survival more difficult. Pakistan must take urgent action to protect this important species.

Since the partition of India in 1947, the human population in the snow leopard's range in Pakistan has quadrupled, and livestock numbers have increased by 40 to 60% (*3*). Habitat loss driven by human activities and economic growth has fragmented the snow leopard's habitat. Overgrazing has caused severe degradation of grasslands, and an overabundance of livestock has encroached on the habitat of wild ungulates, decreasing the prey available to snow leopards (*4*).

Growing human populations and livestock in the snow leopard's habitat have led to increased illegal trafficking, poaching, and human-wildlife conflict. On average, one snow leopard per day has been lost to poaching during the past decade (*5*). Snow leopards are also frequently killed in reprisal for attacks on local herders' livestock (*6*).

In addition to these harmful trends, global warming is causing the forest line in mountainous regions to move to higher altitudes, compressing the suitable habitat available to snow leopards. Changing climate has also allowed leopards and other low-altitude carnivores to migrate to higher altitudes, increasing the snow leopard's competition (*7*). Furthermore, reduced glacier cover will lead to increased drought risk, changes to local flora and fauna, and fewer food alternatives for species like the snow leopard (*8*).

The snow leopard is a top predator and an indicator of the overall health of its high-altitude habitat (*9*). To protect the species, Pakistan must mitigate the effects of climate change and human settlements (*10*). Priorities for climate-informed conservation should include passing legislation to prevent poaching and retaliatory killings. Predator-proof livestock cages could decrease the chances of human-wildlife conflict. Helping people in the snow leopard's range adapt to the effects of climate change will also benefit wildlife, as will continuing efforts to minimize habitat degradation. Training and education could help tourists and the public avoid the species' habitat. Researchers should learn more about the species' biology, especially its genetics and the diseases to which it is susceptible. To monitor progress, Pakistan should track the number of snow leopards and look for trends in population size and distribution.

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Primary forest loss in biodiverse Indian states

Primary forests—old-growth forests that have remained undisturbed by humankind—comprise one-third of the world's forests. These dense, wild forests are important habitats for unique species (*1*) and provide a variety of ecosystem services, including global biosphere-atmosphere CO_2 exchange (*2*). Such forests are irreplaceable in terms of biodiversity value and ecosystem services, and replantation to compensate for such forest loss is inadequate (*3*). Yet loss of primary forests continues all over the world, and governments have failed to protect them (*4*). For example, in India, primary forest is being lost in biodiversity hotspots, which should be environmental priorities. India's government must acknowledge the value of primary forests and prioritize their conservation by committing to holistic conservation strategies.

India is home to four global biodiversity hotspots, including the Himalayas and the Indo-Burma region. These areas, with high altitudes and unique climates, support a variety of ecosystems and harbor distinct species diversity and endemism (*5*, *6*). However, nine states in the Himalayas and Indo-Burma regions accounted for 89% of total primary forest loss in India between 2015 and 2021 (*7*). Between 2002 and 2021, India saw a 3.6% reduction in the total area covered by humid primary forest (*7*).

The ongoing primary forest loss will have detrimental effects on global environment and biodiversity. In these high-altitude areas, the rate of regional warming has exceeded the rate of global warming (*8*). The massive forest loss, climate extremes, increased temperatures, and altered rainfall pattern in these biodiversity hotspots intensify competition for species survival, leading to both species extinction and changes in species distribution (*9*, *10*). Deforestation in the Himalayas alone is expected to cause the extinction of a quarter of endemic species by 2100, including 366 vascular plant taxa and 35 vertebrate taxa (*11*).

Scientists, activists, and the public must persuade local and national governments to pass legislation and implement holistic strategies that halt primary forest loss. Sustainable forest conservation strategies include community conserved forest management, in which the residing communities (mostly native and tribal peoples) are given rights to the forest, and strict prohibition of forest land diversion for nonforestry purposes, including infrastructure. It is time to secure the long-term integrity of these irreplaceable primary forests.

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NEXTGEN VOICES: SUBMIT NOW

When internships disappoint

Add your voice to *Science*! In this NextGen Voices survey, a reader asks for your advice! Have you been in this situation or one like it? Do you have any tips that you would like to share? Become a NextGen Voices peer mentor by contributing your thoughts!

Dear NextGen Voices,

I am an undergraduate student trying to get exposure to research in a lab. I found an internship, but the graduate students and even postdocs seem to resent the idea of an undergraduate in the lab. Some have said that I take up valuable time and resources that should be devoted to more experienced lab members. I am often excluded from even informal conversations and activities. This unwelcoming culture took me by surprise and has decreased my motivation to pursue science. What should I do to improve my current situation, and how can I learn from this experience when making future career decisions?

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Unwelcome Undergrad

To submit, go to www.science.org/nextgen-voices
Deadline for submissions is 19 August. A selection of the best responses will be published in the 7 October issue of *Science*. Anonymous submissions will not be considered.

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TECHNICAL COMMENT ABSTRACTS

Comment on "Pushing the frontiers of density functionals by solving the fractional electron problem"

Igor S. Gerasimov *et al*.

Kirkpatrick *et al*. (Reports, 9 December 2021, p. 1385) trained a neural network–based DFT functional, DM21, on fractional-charge (FC) and fractional-spin (FS) systems, and they claim that it has outstanding accuracy for chemical systems exhibiting strong correlation. Here, we show that the ability of DM21 to generalize the behavior of such systems does not follow from the published results and requires revisiting.

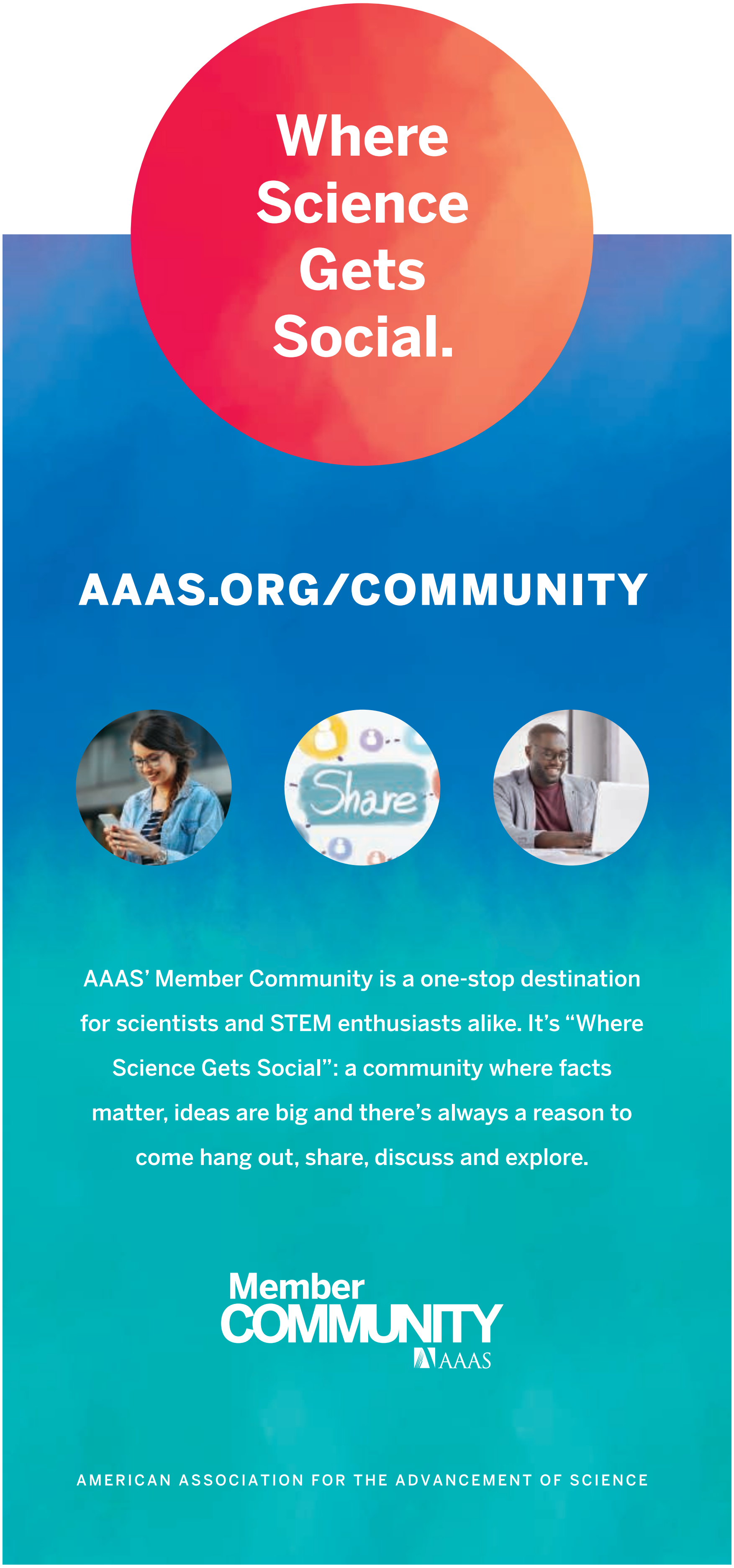
Full text: dx.doi.org/10.1126/science.abq3385

Response to Comment on "Pushing the frontiers of density functionals by solving the fractional electron problem"

James Kirkpatrick *et al*.

Gerasimov *et al*. claim that the ability of DM21 to respect fractional charge (FC) and fractional spin (FS) conditions outside of the training set has not been demonstrated in our paper. This is based on (i) asserting that the training set has a ~50% overlap with our bond-breaking benchmark (BBB) and (ii) questioning the validity and accuracy of our other generalization examples. We disagree with their analysis and believe that the points raised are either incorrect or not relevant to the main conclusions of the paper and to the assessment of general quality of DM21.

Full text: dx.doi.org/10.1126/science.abq4282



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