



People in St Petersburg, Russia, protest against their government's actions.

Among the strongest actions taken so far is the decision by a group of Germany's largest research funders, including the German Research Foundation, to freeze all scientific cooperation with Russia. In a 25 February statement, the group – the Alliance of Science Organisations in Germany – says that the country's research funds will no longer benefit Russia, that no joint scientific events will take place and that no new collaborations will begin. "The Alliance is aware of the consequences of these measures and at the same time deeply regrets them for science," it said.

"My former student lives in Germany and we still collaborate. She was informed by her superiors that any contact with Russian scientists would be strongly discouraged," says Mikhail Gelfand, a co-organizer of the Russian scientists' letter and a biology lecturer at the Skoltech Center of Life Sciences in Moscow. "From what I see, it's happening in many places."

The mood among colleagues in Russia is "terrible", Gelfand says. "Nobody thought it would come as far as direct invasion. Nobody thought that Russia would attack Kyiv." Gelfand says that he hopes there is a way that general sanctions don't harm individual scientists, many of whom oppose the war.

### Collaborations cancelled

In the United States, the Massachusetts Institute of Technology (MIT) in Cambridge ended its relationship with the Skolkovo Institute of Science and Technology, or Skoltech, in Moscow, which it co-founded in 2011. "We take it with deep regret because of our great respect for the Russian people," says a 25 February statement from MIT.

And on 5 March, the European Commission said that it was suspending scientific cooperation with Russia. In a statement, it said it would stop payments to Russian research partners

and review all projects that involve Russian research organizations under Horizon Europe and its predecessor Horizon 2020.

Another high-profile cancellation is the four-yearly conference of the International Mathematical Union, which awards the prestigious Fields Medal and was scheduled to be held in St Petersburg in July. After mounting pressure from national mathematical societies and more than 100 of its invited speakers, the

## 'WE HEAR SHELLING': UKRAINIAN SCIENTISTS STAND IN DEFIANCE

Researchers tell *Nature* about their experiences of the Russian invasion.

By Nisha Gaiand, Holly Else & Antoaneta Roussi

"I survived this already eight years ago," says economist Illya Khadzhyonov. "I am from Donetsk."

As the world awoke to news on 24 February that Russia had invaded Ukraine, including its capital Kyiv, Ukraine's people were being forced to make impossible decisions about whether to stay and shelter, attempt to flee or fight for their country.

As the conflict continues, Ukrainian researchers have described to *Nature* how they have responded. Some say that their colleagues and students have taken up arms to defend their country. Others have stayed in

union said on 26 February that it would hold the International Congress of Mathematicians online in light of the conflict.

### Further action

Some Ukrainian scientists say that the actions announced do not go far enough. In particular, Russian academic institutions have failed to condemn the aggression, says an open letter from the Academy of Sciences of the Higher School of Ukraine. Restrictions on Russian scientists must be all-encompassing, they say: "We urge that researchers with an affiliation of such institutions not be admitted to international grant teams, not be invited to international conferences, and not be published in leading international scientific journals."

The editorial board of at least one journal, the *Journal of Molecular Structure*, has decided to no longer consider manuscripts authored by scientists working at institutions in Russia.

Alexander Kabanov, a Russian-US chemist at the University of North Carolina at Chapel Hill who co-organized a letter from Russian researchers living overseas, says that support for Ukrainian researchers is the next step. "Right now, many Ukrainians are fighting for their country and some are refugees," he says. The Western academic community should develop programmes of support for Ukrainians who need education and scientific training, Kabanov says. "I believe the laboratories should be open for them."

cities, looking after their families and watching the devastation wrought by Russian shelling. "We are not thinking about research," says Khadzhyonov.

### Air-raid alerts

Khadzhyonov is vice-rector for scientific work at Vasyl' Stus Donetsk National University. In 2014, the 85-year-old university relocated to Vinnytsia in central Ukraine, displaced by the conflict in the Donbas region, parts of which are claimed by separatists. "It moved to Vinnytsia with no resources, no buildings. It had a rebirth," says Khadzhyonov.

For Khadzhyonov, the events of the past week remind him of that time, when he was forced to leave his hometown of 35 years. "It's the second

VALYA EGORSHINA/NUPHOTO/GETTY

time in my life this is happening. I thought I had forgotten all this horror. Unfortunately, it is repeated.”

When the attack came on 24 February, Khadzhynov’s priority was his students’ well-being. “We are thinking first of our students and personnel – what should we do and what should we say to them,” he says. “The main point for us is to give students psychological help and assistance for mental health.” Khadzhynov had not seen Russian forces in Vinnytsia when he spoke to *Nature* on 2 March, and had been going to his university to work every day. But air-raid alerts were ongoing. “The air alarms help us. In Donetsk, there were no air alarms, they simply started shelling.”

Many students at Khadzhynov’s university have entered the territorial defence forces, which are handing out weapons to any adult willing to defend the country; about 18,000 arms have been given out. Ukraine has announced conscription of all men aged 18–60, but students and those teaching in universities or in scientific positions are exempt, says Khadzhynov.

### Picture from Kyiv

“It is probably coming to the next Russian bombardment,” says Maksym Strikha, a physicist at the Taras Shevchenko National University of Kyiv, from his apartment in the centre of the city on 1 March. “We hear shelling every day.”

The front line is about 30 kilometres away, he says, and Russian soldiers are continually trying to penetrate the city. Many younger students at Strikha’s institute have also taken up arms. “They are either on the battlefield or supporting the army,” he says. (Colleagues his age and older – Strikha is 60 – are too old to fight, he says.)



Ukrainian soldiers walk in the centre of Kyiv, which is being bombarded by Russian forces.

“I can make no plans,” says Strikha. “Yesterday, I sent my colleagues a draft of my manual in Ukraine of solid-state physics. If the situation will not be good for me, maybe someone can edit this manual and publish it.”

Due east of Kyiv, 30 kilometres from the northeastern Russian border, is Sumy National Agrarian University. Yuriy Danko, an economist and vice-rector for scientific work at the institute, says that shelling has damaged dormitory and university buildings. “All windows were broken, all doors were broken, all floors were destroyed.”

“There are victims,” says Danko. “Including many among the civilian population.”

Danko says that some students left but most remained. The city has formed a territorial

defence unit that accepts all types of people. “Students and scientists took up arms today.”

On 1 March, Danko was at the university helping students who hadn’t had time to leave and were still in dormitories – about 400. These include 170 students from other countries, including China, India and Nigeria. “It is currently impossible to evacuate them and they are in bomb shelters. We are in bomb shelters during bombings and at night.”

### Coordinating help

From Riga, Sanita Reinsone, a digital-humanities researcher at the University of Latvia, is coordinating efforts to help Ukrainian scientists. On 26 February, she made a Twitter account for the hashtag #ScienceforUkraine, which has garnered more than 4,000 followers. Within days, institutes and laboratories were providing information about scholarships, fellowships and even offering to pay salaries for Ukrainian researchers. “I didn’t expect the calls of support to be so wide,” said Reinsone. Offers have come in from Chile to Japan. Reinsone took on the task of organizing the opportunities after feeling that she couldn’t sit and watch as a neighbouring country struggled under Russian aggression. “It was personal for me,” she says.

A continent away in Lexington, Massachusetts, the situation in Ukraine reminds physicist George Gamota of his childhood. He fled Ukraine with his family in 1944, aged 5, and arrived in the United States in 1949. After a career working at Bell Labs, the Pentagon and as an institute director at the University of Michigan, he helped Ukraine to develop its scientific system after it gained independence. “Six months ago, I was excited to see young people working in labs and heading departments,” says Gamota. “What will happen now is anybody’s guess,” he says.



Russian shelling hit Kharkiv National University in Ukraine’s second largest city.