November 2020

The Physics Zone ran from 2 to 27 November 2020. The Zone was one out of 4 Zones that ran as part of *I'm a Scientist: On Demand* in November 2020.

I'm a Scientist: On Demand aims to offer greater flexibility to teachers in how, and when, they can take part in *I'm a Scientist*. This is in response to the COVID-19 situation and greater restrictions and uncertainty in schools.

The Physics Zone was funded by the Ogden Trust.

Scientists

- 36 scientists created profiles in the Zone.
- 35 scientists engaged with students through live Chats and/or Ask questions.
- Scientists from a broad range of fields and career stages took part. For example:
  - Leah Morgan - project engineer for the UK Atomic energy Authority
  - Pratik Samant - Postdoctoral researcher at University of Oxford
  - Viviene Dela Cruz - development scientist working for the STFC

Students

- 616 students from 20 schools logged into the Zone.
- Turnout was 61% of the 1,000 capacity.
- 70% of active students were from target schools (WP and/or U).
  - 38% were from widening participation (WP) schools.
  - 48% were from underserved (U) schools.

Live Chats & Questions

- 34 live Chats took place took place during the activity.
- 46 live Chats were booked (77% of capacity), but dropout was higher than usual with 9 cancellations and 3 'school no shows'.
- On average, 5 scientists attended each live Chat session.
- 1 teacher typed questions in a live Chat on behalf of their students, so the number of students engaged may be higher by up to 25.
- 267 student questions were approved. Scientists responded with 525 answers.

Key figures		Nov 2020 average
Schools	20	20
Students logged in	616	488
% of students active	87%	83%
Scientists onboarded	36	42
% of scientists active	97%	88%
Questions asked	463	176
Questions approved	267	104
Answers given	525	263
Scientist comments	63	47
Student comments	13	5
Votes	379	262
Live chats	34	30
Lines of live chat	12822	9562
Average lines per chat	377	321

Impact of the COVID-19 pandemic

Uptake across all November 2020 Zones was much lower than initially expected.

The COVID-19 pandemic increased uncertainty and pressure in schools. Many teachers reported lost time due to school closures and students isolating, and a need to focus on the core curriculum.

Student attendance dropped to 65% for some schools in November. The rapidly changing situation made it difficult for teachers to plan ahead. Many schools restricted access to shared IT equipment, leading some teachers to ask questions in live Chats on behalf of their students, projecting the Chat on a screen. The average class size attending a chat was 25% below normal.

School activity

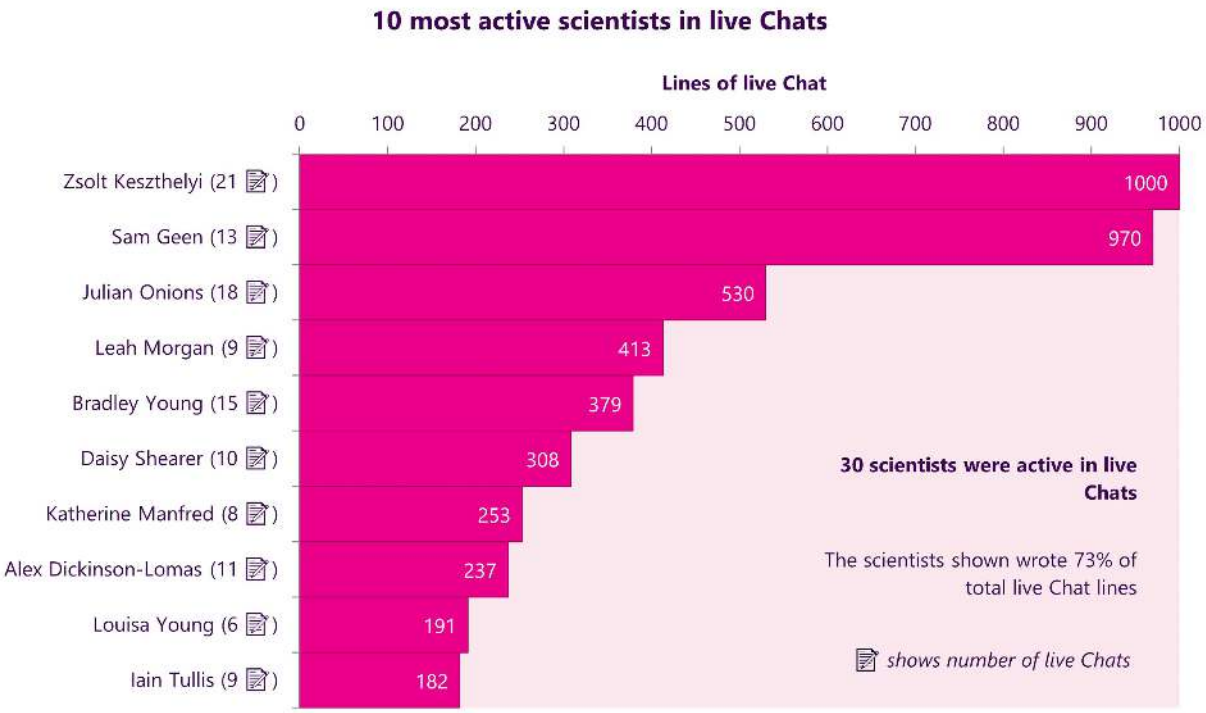
School	Active students	Chats attended/ booked	Live chat lines Total	Live chat lines Per student	Questions approved
Reepham High School and College, Norwich (U)	108	5/5	1477	14	14
Sønderborg International School, Denmark	83	4/4	1539	19	200
St Bridget's Primary School, Glasgow (WP)	50	2/2	704	14	0
Sandymoor, Runcorn (WP/U)	47	1/2	657	14	0
The Manor Academy, Mansfield (WP/U)	37	2/2	408	11	11
Bedwas High School, Caerphilly (U)	31	3/6	345	11	1
Westquarter Primary School, Falkirk (WP)	30	1/1	36	1	2
Robert May's School, Hook (U)	24	1/1	278	12	0
Prendergast Ladywell School, London (WP)	23	1/1	127	6	8
Horbury Academy, Wakefield	22	1/1	294	13	0
Bristol Cathedral Choir School, Bristol	20	1/1	261	13	0
Turnbull High School, East Dunbartonshire	16	1/2	111	7	2
Co-Op Academy Leeds, Leeds (WP)	15	1/1	146	10	5
Arbroath High School, Angus (U)	10	1/1	96	10	0
Richard Coates CE Primary School, Newcastle-Upon-Tyne	10	1/1	13	1	23
The Oratory School, Reading	5	1/1	73	15	0
Northfield School, Billingham	4	1/1	53	13	0
Frome Community College, Frome	2	Only joined evening chat	0	0	1
Gillotts School, Henley-On-Thames*	1	1/1	19	19	0

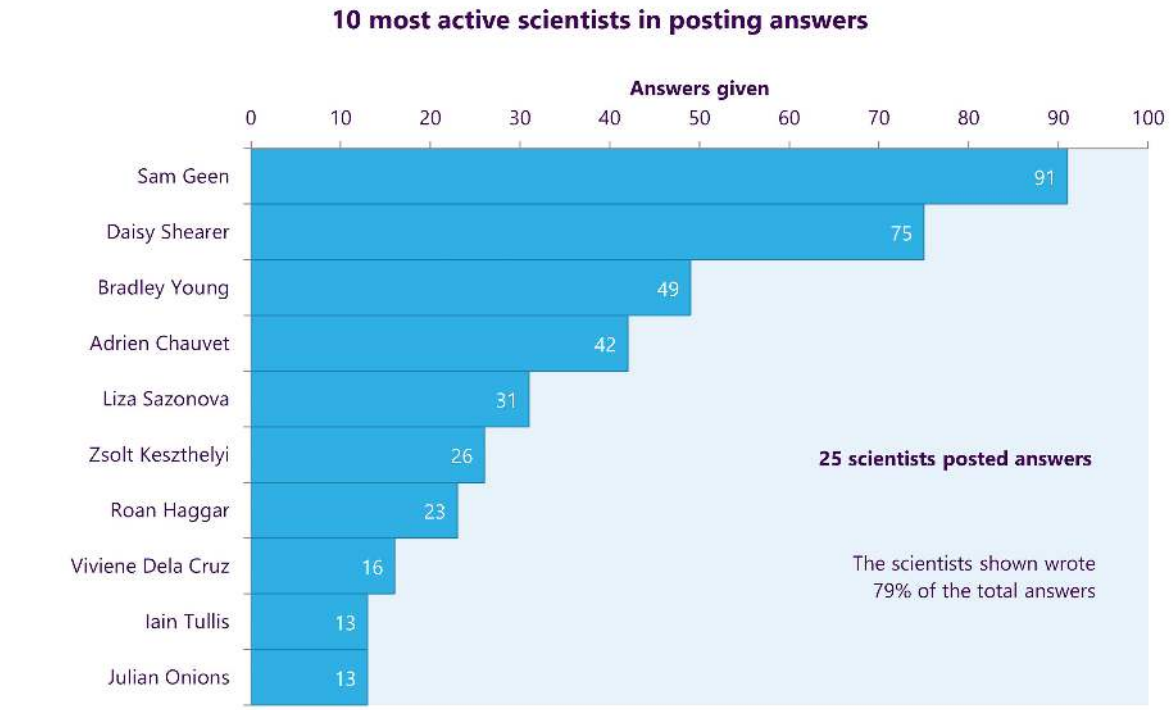
*These schools took part through the teacher account due to restricted access to individual student laptops.

We want to increase the participation of under-represented groups going into STEM careers. Find out what we mean by our under-served (U) and WP schools (WP), and how you can support us in working with more of these at: **about.imascientist.org.uk/under-served-and-wp/**

Scientist activity

36 scientists were active in the zone, writing 6,153 lines of live chat, and providing answers to 525 posted questions.

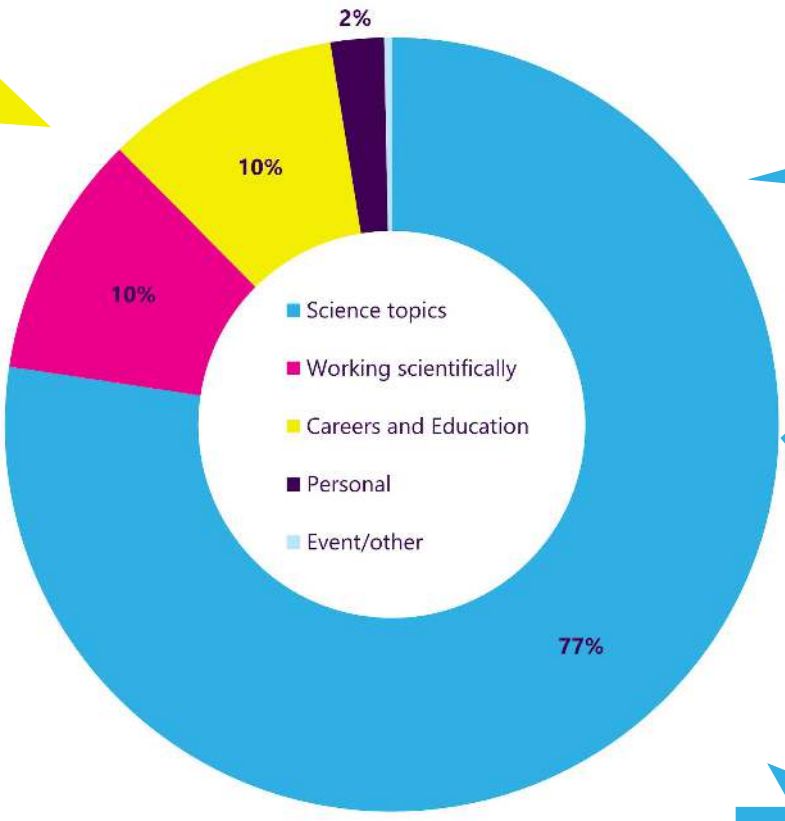




See all the participating scientists: physicsn20.imascientist.org.uk/scientists

Frequent words used in live Chats by students and scientists

Question themes and examples



What is your field of work and what inspired you to pursue this career?

Can mass effect time? If yes how?

How do you research future electronics, and what do you use?

Do you think that there is a multiverse or a parallel universe if there is can we get there somehow?

What are nuclear rods made of? Which atoms?

Do we know how large/old the universe is? If so, how did we measure that?

An atom is made of protons, neutrons and electrons. So what are these three made of?

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Examples of good engagement

Scientists and students would often merge science conversations with conversations about personal interests. This helps them relate on a personal level and build rapport, such as in this conversation about quantum physics and the Avengers movies:

Holliew Is the universe deterministic

> **Sam** @Holliew: We think not - quantum physics means that genuinely random things can happen. But maybe there are other rules behind quantum physics that make it deterministic again?

Niamh T @Sam: by quantum physics do u mean the stuff from avengers that helps them time travel lol

> **Sam** @Niamh T: I will be honest that I've not seen all of those. But I think that's what they're referring to

Niamh T @Sam: haha its in the last one i won't spoil anything

> **Sam** @Niamh T: I think I've read spoilers already... hard to avoid

Niamh T @Sam: haha true. i watch every few weeks tbh lol they're so good

> **Sam** @Niamh T: I want to see Antman, Paul Rudd is cool

Niamh T @Sam: i totally agree

> **Sam** @Niamh T: I saw Black Panther and Captain Marvel most recently

Niamh T @Sam: R.I.P black panther

> **Sam** @Niamh T: Maybe I'll marathon them all sometime

There were many conversations about different topics in physics, such as how we know the value of a second and how this measure was decided. The scientists were good at trying to explain complicated subjects in ways students could understand:

imontheedge @all How do we measure time? We have clocks which measure seconds, minutes, and hours (and before that we had sun clocks and such) but don't these really measure the cycle of the earth? Can we measure time independent of the earth?

> **bradleyyoung** @imontheedge: Great question! Really accurate clocks use something called an atomic clock which measures the rate of decay of a radioactive material. If you know the probability of radioactive decay per second and you know how many radioactive decays have occurred then you can work out how many seconds have passed

imontheedge @bradleyyoung: but would you not need to use the value of a second to do that?

> **bradleyyoung** @imontheedge: What a great point! Actually, the official definition of a second is related to the rate of decay of a cesium atom now

Students also expressed inspiration and enthusiasm for science as a result of talking to the scientists, and expressed a desire to pursue a career in STEM themselves:

Jamesb @Eleanor: wow you are so inspiring scientist like you make me interested in science and want to progress to be like you

> **Eleanor** @Jamesb: Really?! That's so good to hear! Keep going!

Jamesb @Eleanor: thank you i will never stop untill im like you

> **Eleanor** @Jamesb: Go for it!

Scientists of the Week

Students voted each week for their favourite scientist to be named *Scientist of the Week*. The 4 *Scientists of the Week* were:

Iain Tullis, **Sam Geen, Zsolt Keszthelyi**, and **Louisa Young**.

The overall winner in this zone was **Zsolt Keszthelyi.**




Feedback

"We have some great information and have found out a lot about being a scientist."

Student

"Thank you from a very grateful teacher. They had great fun!"

Teacher

"I wish to thank the students for participating. It has been so much fun to be able to chat with many of you. It is absolutely astonishing how many great questions you all have had."

Zsolt Keszthelyi, Physics Zone Winner