The National Youth Science Forum (NYSF) received over 1250 applications from all corners of Australia to participate in the country's flagship science, technology, engineering, and mathematics (STEM) youth program. Over its 39-year history, the NYSF Year 12 Program has connected more than 14,000 participants with leading STEM experts from across Australia and the world, and 2022 was no different!

I was amongst the 627 incredible students selected to participate in the 2022 NYSF Program. It featured a new look and had a COVID-safe program that included digital workshops, lectures, and virtual tours. It was a bit difficult being online instead of in-person but there were still so much that I learned and loved.

With record numbers attending the 2022 NYSF Year 12 Program, participants were able to access 73 live digital sessions with 195 speakers and 15 in-person STEM visits over 5 days in Perth. Additional STEM visits will be scheduled in other states throughout 2022 when safe to do so. Participants fully embraced digital networking with their peers and international STEM experts and worked together to solve some of the country's most important and complex STEM challenges. Participants were tasked with a range of challenges including an innovation proposal to meet the Australian agricultural budget for 2030, communicating about what they have learnt to the public, designing techniques for solving cybersecurity ciphers, finding innovative ways to creatively encourage more girls and women in STEM and to pitch new ways Australia can achieve its goal of net-zero emissions by 2050.

I entered a couple of these competitions and submitted a video for The communication challenge on the properties of pykrete. I also joined some other girls at NYSF to submit a report on monitoring cube satellites as a solution for the agricultural 2030 target. It was a lot of fun even if we didn't win anything and it felt great to get involved and really make full use of my time at NYSF.

The 2022 NYSF Year 12 Program featured two Nobel Prize winners, numerous top experts in subjects ranging from forensic anthropology to drones, workshops with leading scientists and STEM organisations, and an array of live crosses to some of the world's very best science and technology facilities, including to Mawson Antarctica station, CERN particle accelerator and the natural history museum.

My top four favourite highlights had to be the ASD cryptography presentations. I also loved the lectures on gravitational waves and black hole jets held by PHYSICS PROFESSORS from famous universities here in Australia. I also liked the Antarctica live cross and meeting the researchers there as well as the Australian nuclear research facility virtual tour/overview with ANSTO.

The lecture on cryptography taught me about the history and future of code-breaking and code making also called cryptography. It is used to protect things like websites and important documents. The main method of encryption or codemaking is AES which is very hard to crack because of the multiple combinations that could be one of the correct codes. The future of cryptography will be in jeopardy if quantum supercomputers are introduced. They are so fast that they will be able to run through all of these combinations really quickly to find the right one. This will make AES, our standard form of encryption, very easy to crack. So a new form of encryption will need to be found to beat it.

Another highlight of NYSF was the lectures on black hole Jets and gravitational waves. I learnt that black hole jets were actually made of Plasma. Created by charged particles in rotating magnetic fields. I also learnt about gravitational waves in another lecture and how they are actually ripples in space-time often created by two black holes orbiting each other. I really loved learning more about physics since it is one of my favourite subjects at school and I have always been fascinated by space and all the mystery around it. While I'm not sure about living on Mars one day, I would love to be one of the engineers that help us to land humans on another planet for the first time.

Another really cool stem visit was the live cross with researchers in Antarctica. We go to meet the only doctor in the whole of the Australian research stations and learn about what life was like living in such extreme conditions. We got to see photos and hear stories of the research and amazing geological landscapes that are over there. I loved the experience and it was so exciting to be actually talking to someone in Antarctica. I think one of my favourite parts of NYSF was being encouraged to feel like I can do anything I want to if I put my mind to it. After this visit, I absolutely felt that if I wanted, I could be a researcher in Antarctica if I wanted to.

Lastly, I really enjoyed the virtual tour of ANSTO and learning about what sort of research and studies they are doing. The OPAL research reactor is used to create neutrons and nuclear medicine and we learnt how they make the medicine and transported it to medical practices. It is one of Australia's only nuclear medicine production sites so it is very important to our society. We also learnt about the synchrotron and how it is like a small particle accelerator for research. I also learned about the different careers at ANSTO and got to chat with the scientists who were working there.

Another awesome thing we did that I could not just leave out, was our live cross to particle physicists at CERN laboratories in Switzerland. It was so cool to see the accelerator and even online the building still looked super big. We met two physicists, both working on the ALICE experiment and they told how us how particles collide in the accelerator and break up thus showing us what they are made of. I also love the live cross to the Parkes telescope. We even got to see a video of it moving as someone in the laboratory made it point at different places in the sky. We investigated the light emission graphs from different points to determine whether they were star pulsars in outer space.

Another aspect of NYSF that was super helpful and also really cool was the careers presentations we had. I've included some photos here from our lectures. We heard from so many amazing employers and universities and I am so excited to see where my future is going to be after I leave school. We heard from Lockheed Martin, the Australian space agency, csiro, the defence technology group, quantum brilliance and so many other employers. From the career paths, we were shown, I think my favourite careers had to be aerospace engineering or becoming a physicist.

Some other really cool things that happened at NYSF was the Nobel laureate lectures that we got to hear. One was from professor Brian Schmidt who now is the chancellor of ANU. He got a Nobel prize for his work in physics regarding black holes and gravitational waves. We also heard from peter Doherty whose Nobel prize was in physiology and medicine.

Another really awesome guest speaker that we got to hear from, was Dr Karl a famous Australian science communicator who has done plenty of podcasts, talks and shows with Australian news agencies. I really enjoyed hearing from people who have achieved so much in the STEM industry.

Another great thing that we had at NYSF that made the whole entire experience a lot more enjoyable, was the community and friendships that we made. I was even able to connect with a long lost friend who I hadn't seen in 10 years. I also loved our constellation groups where we met with a student staff leader and ten other NYSFers and just had a fun time playing games and connecting. One day the leaders even made a talent show video out of a bunch of NYSFers performance videos that they had sent in. We also organised extra meet-ups where we met to play Kahoot or watch movies and we also had our discord server where we got to chat about different topics.

As NYSF alumni there are so many amazing things that I have learned and will definitely take away to apply to my school and my future. I know that with this newfound scientific knowledge and career information I can share it with my STEM club at school. I know that I can now really be more informed and helpful in encouraging them to explore their love for science. As one of the club co-founders I am really looking forward to this year in the STEM club and just being able to be a part of encouraging the future generation. I also am definitely going to stay curious and keep on learning new things. I also want to keep on pursuing stem opportunities. For example, I know that a couple of my friends and I within my school are auditioning for a STEM competition and we are super excited.

I also want to thank you so much for the opportunity to go to NYSF. This has been a truly inspiring and amazing experience for me. I have loved every minute of it, even when though they were long 8 hour days online. Coming back to school I have even noticed an improvement in my motivation to do schoolwork. Since most of the subjects are stem-based, NYSF reminded me why I love them so I've been able to feel more motivated to study and work hard, knowing that I'm not just doing this to get a good grade but because I love it. So once again thank you so much for this whole experience I hope you have a good rest of your morning Thank you!