

BIMSA INVITES

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When you think of the top-tier mathematical research institutes nowadays, what are the first names that come to mind? According to the plans of its founders, the Yanqi Lake Beijing Institute of Mathematical Sciences and Applications (BIMSA for short) is a name that will join that venerable list in the very near future.

Founded in 2020 as part of a government plan to establish a new science city in Huairou (怀柔), at the foot of the mountains in the north of Beijing with a direct view of the Great Wall, BIMSA is intended to be home to some of the best mathematicians in the world, both pure and applied. Originally, Huairou was just an industrial town in the suburbs of Beijing until the government decided to close all its factories for the sake of cleaner air in the city. The breathtaking scenery will not be tainted by factories but rather inspire world-leading research.



Name recognition normally comes with time and tradition. But this principle was never taken very seriously in China. In a time when funding for research and education becomes scarce in the West, and despite rumors of slowing down economic growth and the high cost of the pandemic, China's unwavering commitment to basic research results in reliable and even increasing funding for its institutions.

It was a summer day in 2019 when Shing-Tung Yau [or 丘先生 (Qiu Xian Sheng)], as the Chinese refer to him, which though it could be translated to mean

just “Mr. Qiu” only (Qiu being the Mandarin pronunciation of Yau), is used in this context as an honorable title for the most respected scholars], received a sudden call from the mayor of Beijing inviting him to breakfast. In a country famous for its culinary culture, all important business must be discussed over food. So it was at that meeting, Yau was offered the opportunity to create from scratch an institute of his liking within the facilities of the to-be-modernized old factories of Huairou, with nearly unlimited resources – or at least, that is how it feels for mathematicians. Despite already running the Yau Mathematical Sciences Center (YMSC) at Tsinghua University (清华大学), Yau immediately agreed and was asked to visit the factory sites just three days later. Altogether, it took merely a week till a handshake deal for BIMSA was reached.



Tsinghua University is one of the two top universities in China, separated from the other, the Peking University (北京大学), only by a street. These two institutions are the coveted academic destinations for millions of teenagers who take the GaoKao (高考) [the infamously competitive university entrance exam in China] every year, with many students preparing for this moment all their lives. Located in the heart of Beijing, with its fast-growing population, Tsinghua struggles to accommodate all its equally growing student and academic population on campus. Thus, the YMSC though established already 14 years ago in 2009, still does not have a facility of its own, despite renewed promises every year.

The lack of facilities naturally limits the development of the institute. But space and scenery are what Huairou has to offer, despite the distance of 1.5-hour drive from Tsinghua to BIMSA. Furthermore, the city’s plan for the new silicon-valley-to-be of Beijing goes far beyond attracting tech firms and establishing research institutes – all major Beijing universities and research institutions are expected to open a branch in the area. It is rather embedded in a comprehensive infrastructure

plan that includes housing, childcare, schools, and leisure activities for employees and their families. Additionally, better public transportation is being developed on the Beijing-Huairou route.

The pace at which things moved forward in 2019/2020 did not allow for much time to carefully plan and design. Originally, the institute was supposed to be about applications only, but without basic research there is nothing to apply. Thus, Yau bargained with the authorities that 25% of the institute's funding should be dedicated to pure mathematics. Very soon researchers were hired, with Ding JinTai (丁津泰) and Zhang XiaoMing (张晓明) among the first, and BIMSA found a temporary home in the Villa 11 of the Yanqi Hotel. This hotel resort is famous for hosting the APEC meeting on Yanqi Island in 2014 and has since hosted many more international meetings of a similar kind. Having an institute inside a hotel building may sound peculiar at first, but it has some surprising features, such as having one's own bathroom, and in some cases, even a dried-out swimming pool in one's office. Of course, there are also beautiful park facilities for after-lunch walks.

Fast forward to May 2023. BIMSA has hired over 120 researchers from all over the world including 25 Research Fellows [the direct translation from the Chinese title 研究员, which is equivalent to full professors working at research institutions] and over 60 postdocs. The Villa 11, which served as the temporary home of the institute, is now bursting at the seams. Most common rooms have been turned into offices, and everyone is eagerly awaiting the move into the new permanent facilities. Previously a cement plant, the modernization plans of a German archi-



tecture firm in collaboration with a local firm put emphasis on environmentally

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friendly materials and construction techniques that preserve the nostalgic charm of a closed factory while transforming the insides of the old buildings into an up-to-date mathematics research center. Probably the most eye-catching part of the architecture are the old concrete towers that are now connected through a common attic accommodating small apartments for graduate students. The four office buildings on the other side of the street feature high-end multimedia equipment to hold hybrid conferences in all lecture halls, next to traditional blackboards, which can also be found in every office. Additionally, the buildings have many small discussion areas as well as multiple tea and coffee rooms, ticking off every item on a wish list of the common mathematician.

Resource stability, a beautiful location, and modern facilities, all these are optimal initial conditions for creating a flourishing research institute. But all these would be worth nothing without the people. The success of BIMSA will be measured by how much its people can contribute to moving science forward, and funding, though essential, will not result in knowledge on its own. The immense pace at which BIMSA expands does not come without growing pains. In contrast to other institutions that welcome a few new faculty every year and incorporate them into existing structures, everything here needs to be built from scratch, including those little details that are naturally present at an established institution. Within the mere 2.5 years of its existence, nineteen research groups were formed,



ranging from number theory to geometry to mathematical and theoretical physics to computer science and finance. At maturity, BIMSA should be home to over 300 researchers organized into over 20 groups. Moreover, its own graduate program was created, and the first students will be enrolled this fall. In addition, over 20 administrative staff have been hired, with one of its largest groups being

the international affairs department, with staff who speak not only English but also Italian and Spanish. Their purpose is to help new faculty settle in and facilitate paperwork for the increasingly international members. Their far-reaching and seemingly 24/7 service starts with helping researchers and their families with all visa and work permit issues, includes finding suitable housing and schools for children, organizing Chinese classes, and ends with all sorts of private errands where Chinese knowledge is essential. It is amazingly reassuring to know that someone will have your back whenever needed, and this general attitude of all staff here, that they are there to make things possible and not show where the limits are, is refreshing.

Now, the connective tissue that merges all these individuals into one institute needs to be produced, and BIMSA is currently experiencing the transition from a small start-up to a mature organization. The casual way of things that worked so well at the beginning is reaching its limit and is in the process of being replaced by proper structure. This is probably a unique opportunity to bring together the collective experience of all faculty, combine the best features of research institutes around the world, and add some unique Chinese elements to create an unprecedented cutting-edge research incubator.

In the competition for the best, the name Yau vouches for the scientific quality of BIMSA. While a competitive salary can be offered, relocating to China is a brave and adventurous choice for many non-Chinese researchers, especially when families and children are involved. However, researchers coming to Beijing will find a general living standard very comparable to those in Europe or the US, with extremely low crime rates. Moreover, China does have a developed social security and healthcare system, but it works more like the US system than the European one. Foreigners here are unlikely to enroll their children in a local Chinese school; instead, they prefer (and can afford) one of the many international schools, including the British, French, and German schools, which offer top-tier education.

English language skills are essential for mathematicians, so naturally relocating to an English-speaking country is very common. China, on the other hand, is a place many only know by name. At the pace at which this country transforms, the picture people have, of how life here would be, is outdated as soon as they form it. It may surprise many that in the big cities, such as Beijing and Shanghai, life is, for better or worse, more digitalized, and modern than in Berlin, London, Paris, or New York. Although pollution is still a significant problem, the amount of particulate matter has decreased drastically over the last three years, not only due to the pandemic. Depending on where you come from, Chinese culture, with its last-minute plan changes and everything-right-away mentality, is the kind of organized chaos that can be overwhelming. However, this also enables projects to be realized within weeks or months that might take years of preparation elsewhere. Overcoming the language barrier certainly requires additional efforts, but Chinese people are quite understanding in this matter and are helpful where they can be.

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With the first and most difficult steps made, the overall working and living conditions BIMSA now can offer is on par with every renowned research institution in the world. There is every reason to believe that it can live up to its promise and BIMSA is a name worth keeping in mind. The move into the new facilities marks the end of its trial phase and BIMSA invites every one of you to witness and take part in its journey ahead.

About the author: I work in differential geometry and joined BIMSA as a Research Fellow in September 2022. Returning to China after thirty years abroad was never in my life plans. Even in retrospect, I am a little stunned by our courage to move with our family of five from Germany to Beijing during the pandemic. The staff at BIMSA were truly amazing, as they helped us not only with the rather complicated visa issues, but also with settling down, which included many little things in our daily life. After almost a year, we certainly found the adventure we were looking for and we really enjoy living within the international bubble of Beijing.

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