

Hyunbin Kim

Curriculum Vitae

School of Biological Sciences
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Education

- 2021–2025 **PhD, Interdisciplinary Program in Bioinformatics, Seoul National University**, Seoul, South Korea.
Protein structure, Protein structure compression, Structural motif search, Protein structure prediction,
De novo protein design, Development of scalable bioinformatics methods
- Advisor **Dr. Martin Steinegger**, Associate Professor, School of Biological Sciences, Seoul National University, South Korea ([Lab web-page](#))
- 2015–2017 **Master of Science in Agricultural Genomics, Interdisciplinary Program in Agricultural Genomics, Seoul National University**, Seoul, South Korea.
Protein-protein interaction network, Fungal plant pathology, Co-expression network
- Advisor **Dr. Yong-Hwan Lee**, Professor, Department of Agricultural Biotechnology, Seoul National University, South Korea ([Lab web-page](#))
- 2010–2015 **Bachelor of Science in Biological Sciences, School of Biological Sciences, Seoul National University**, Seoul, South Korea.

Research Experience

- 2025–
current **Postdoctoral Fellow, Research Institute for Basic Sciences, Seoul National University**, Seoul, South Korea.
Structural motif search, Development of scalable bioinformatics methods
- Principal Investigator **Dr. Martin Steinegger**, Associate Professor, School of Biological Sciences, Seoul National University, South Korea
- 2017 – 2020 **Researcher, Bioinformatics Analysis Team, National Cancer Center**, Goyang, South Korea, (Substitution for national service as a technical research personnel).
Developed novel computational methodologies for analysis of mutational signatures on tumors samples. Head and neck cancer, Prostate cancer, Somatic mutation analysis on WGS/WES, Bulk RNA-seq analysis
- Principal Investigator **Dr. Dongwan Hong**, Professor, College of Medicine, Catholic University of Korea ([Lab web-page](#))

Software

- 2025 **Folddisco**, Written in Rust, A fast and scalable structural motif search tool, [Repository](#).
- 2023 **Foldcomp**, Written in C++, Structure compression with torsion angle, [Repository](#).
- 2019 **FIREVAT**, Written in R, A variant filtering tool using mutational signature, [Repository](#).

Publications

First author

- 2025 **Hyunbin Kim**, Rachel Seongeun Kim, Milot Mirdita, and Martin Steinegger. Structural motif search across the protein-universe with folddisco. *bioRxiv*, pages 2025–07. Cold Spring Harbor Laboratory, 2025.
- 2023 **Hyunbin Kim**, Milot Mirdita, and Martin Steinegger. Foldcomp: a library and format for compressing and indexing large protein structure sets. *Bioinformatics*, volume 39, page btad153. Oxford University Press, 2023.
- 2019 **Hyunbin Kim, Andy Jinseok Lee**, Jongkeun Lee, Hyonho Chun, Young Seok Ju, and Dongwan Hong. Firevat: finding reliable variants without artifacts in human cancer samples using etiologically relevant mutational signatures. *Genome Medicine*, volume 11, pages 1–17. Springer, 2019.

Co-author

- 2025 Jingi Yeo, Yewon Han, Nicola Bordin, Andy M Lau, Shaun Mathew Kandathil, **Hyunbin Kim**, Eli Levy Karin, Milot Mirdita, David Tudor Jones, Christine Orengo, and Martin Steinegger. Metagenomic-scale analysis of the predicted protein structure universe. *bioRxiv*. Cold Spring Harbor Laboratory, 2025.
- 2025 Hyunuk Eom, Sukhwan Park, Kye Soo Cho, Jihyeon Lee, **Hyunbin Kim**, Stephanie Kim, Jinsol Yang, Young-Hyun Han, Juyong Lee, Chaok Seok, Myeong Sup Lee, Woon Ju Song, and Martin Steinegger. Discovery of highly active kynureninases for cancer immunotherapy through protein language model. *Nucleic Acids Research*, volume 53, page gkae1245. Oxford University Press, 2025.
- 2024 Gyuri Kim, Sewon Lee, Eli Levy Karin, **Hyunbin Kim**, Yoshitaka Moriwaki, Sergey Ovchinnikov, Martin Steinegger, and Milot Mirdita. Easy and accurate protein structure prediction using colabfold. *Nature Protocols*, pages 1–23. Nature Publishing Group UK London, 2024.
- 2023 Caroline Puente-Lelievre, Ashar J Malik, Jordan Douglas, David Ascher, Matthew Baker, Jane Allison, Anthony Poole, Daniel Lundin, Matthew Fullmer, Remco Bouckert, **Hyunbin Kim**, Martin Steinegger, and Nicholas Matzke. Tertiary-interaction characters enable fast, model-based structural phylogenetics beyond the twilight zone. *bioRxiv*, pages 2023–12. Cold Spring Harbor Laboratory, 2023.
- 2020 Seungill Kim, Kyeongchae Cheong, Jieun Park, Myung-Shin Kim, Jihyun Kim, Min-Ki Seo, Geun Young Chae, Min Jeong Jang, Hyunggon Mang, Sun-Ho Kwon, Yong-Min Kim, Namjin Koo, Cheol Woo Min, Kwang-Soo Kim, Nuri Oh, Ki-Tae Kim, Jongbum Jeon, **Hyunbin Kim**, Yoon-Young Lee, Kee Hoon Sohn, Honour C. McCann, Sang-Kyu Ye, Sun Tae Kim, Kyung-Soon Park, Yong-Hwan Lee, and Doil Choi. Tgfam-finder: a novel solution for target-gene family annotation in plants. *New Phytologist*, volume 227, pages 1568–1581. Wiley Online Library, 2020.
- 2019 Ki-Tae Kim, Jaeho Ko, Hyeunjeong Song, Gobong Choi, **Hyunbin Kim**, Jongbum Jeon, Kyeongchae Cheong, Seogchan Kang, and Yong-Hwan Lee. Evolution of the genes encoding effector candidates within multiple pathotypes of magnaporthe oryzae. *Frontiers in Microbiology*, volume 10, page 2575. Frontiers Media SA, 2019.

- 2017 Seungill Kim, Jieun Park, Seon-In Yeom, Yong-Min Kim, Eunyoung Seo, Ki-Tae Kim, Myung-Shin Kim, Je Min Lee, Kyeongchae Cheong, Ho-Sub Shin, Saet-Byul Kim, Koeun Han, Jundai Lee, Minkyu Park, Hyun-Ah Lee, Hye-Young Lee, Youngsill Lee, Soohyun Oh, Joo Hyun Lee, Eunhye Choi, Eunbi Choi, So Eui Lee, Jongbum Jeon, **Hyunbin Kim**, Gobong Choi, Hyeunjeong Song, JunKi Lee, Sang-Choon Lee, Jin-Kyung Kwon, Hea-Young Lee, Namjin Koo, Yunji Hong, Ryan W Kim, Won-Hee Kang, Jin Hoe Huh, Byoung-Cheol Kang, Tae-Jin Yang, Yong-Hwan Lee, Jeffrey L Bennetzen, and Doil Choi. New reference genome sequences of hot pepper reveal the massive evolution of plant disease-resistance genes by retroduplication. *Genome biology*, volume 18, pages 1–11. Springer, 2017.
- 2017 Jongbum Jeon, Ki-Tae Kim, Hyeunjeong Song, Gir-Won Lee, Kyeongchae Cheong, **Hyunbin Kim**, Gobong Choi, Yong-Hwan Lee, Jane E Stewart, Ned B Klopfenstein, et al. Draft genome sequence of the fungus associated with oak wilt mortality in south korea, raffaelea quercus-mongolicae kacc44405. *Genome announcements*, volume 5, pages 10–1128. American Society for Microbiology 1752 N St., NW, Washington, DC, 2017.

Presentations

Oral presentations

- 2024 **Hyunbin Kim**, Rachel Seongeun Kim, Milot Mirdita, and Martin Steinegger. Structural motif detection on the scale of the protein universe with folddisco. In *APBJC2024, 1st Asia&Pacific Bioinformatics Joint Conference JSBi, GIW, InCoB, APBC, and ISCB-Asia*. ISCB, 2024.
- 2023 **Hyunbin Kim**, Milot Mirdita, and Martin Steinegger. Foldcomp: scalable solution for compressing huge protein structure database. In *ISMB/ECCB 2023, The 31st Annual Intelligent Systems For Molecular Biology and the 22nd Annual European Conference on Computational Biology, Lyon, France*. ISCB, 2023.
- 2017 **Hyunbin Kim**, K. Cheong, K.T. Kim, J. Jeon, G. Choi, and Y.H. Lee. Magnet: the integrated gene network of the rice blast fungus *Magnaporthe oryzae*. In *29th Fungal Genetics Conference Asilomar 17, Pacific Grove, CA*. Genetics Society of America, 2017.

Poster presentations

- 2025 **Hyunbin Kim**, Rachel Seongeun Kim, Milot Mirdita, and Martin Steinegger. Unraveling protein structural motifs across the protein universe with folddisco. In *RECOMB 2025, 29th Annual International Conference on Research in Computational Molecular Biology, Seoul, Korea*. ISCB, 2025.
- 2024 **Hyunbin Kim**, Rachel Seongeun Kim, Milot Mirdita, and Martin Steinegger. Structural motif detection on the scale of the protein universe with folddisco. In *APBJC2024, 1st Asia&Pacific Bioinformatics Joint Conference JSBi, GIW, InCoB, APBC, and ISCB-Asia, Naha, Japan*. ISCB, 2024.
- 2023 **Hyunbin Kim**, Milot Mirdita, and Martin Steinegger. Foldcomp: scalable solution for compressing huge protein structure database. In *ISMB/ECCB 2023, The 31st Annual Intelligent Systems For Molecular Biology and the 22nd Annual European Conference on Computational Biology, Lyon, France*. ISCB, 2023.
- 2022 **Hyunbin Kim**, Johannes Söding, and Martin Steinegger. Fast lossy protein structure compression algorithm. In *ISMB 2022, The 30st Annual Intelligent Systems For Molecular Biology, Madison, Wisconsin*. ISCB, 2022.
- 2017 **Hyunbin Kim** and Yong-Hwan Lee. Deciphering protein-protein interaction network in the rice blast fungus, *Magnaporthe oryzae*. In *2017 APS Annual Meeting, San Antonio, Texas*. American Phytopathological Society, 2017.
- 2017 **Hyunbin Kim**, K. Cheong, K.T. Kim, J. Jeon, G. Choi, and Y.H. Lee. Magnet: the integrated gene network of the rice blast fungus *Magnaporthe oryzae*. In *29th Fungal Genetics Conference Asilomar 17, Pacific Grove, California*. Genetics Society of America, 2017.

Computer skills

Programming languages **C++, Rust, R, Python**, C, Go, Shell script

Web technologies HTML 5, Javascript, Typescript

Design software Illustrator, Figma, Affinity designer

Teaching Assistant

Fall, 2021 **Advanced Bioinformatics**, Seoul National University.

Feedback to the student presentation materials for improvement

Spring, 2021 **Introduction to Bioinformatics**, Seoul National University.

Assignment & exam design

Certificate

2019 **Certificate of competency in Fundamental of Deep Learning for Natural Language**,
NVIDIA Deep Learning Institute, Seoul, South Korea.