ADVANCED MATERIALS

Supporting Information

for *Adv. Mater.,* DOI: 10.1002/adma.202209798

Transformation from Magnetic Soliton to Skyrmion in a Monoaxial Chiral Magnet

Long Li, Dongsheng Song, Weiwei Wang,* Fengshan Zheng, András Kovács, Mingliang Tian, Rafal E. Dunin-Borkowski, and Haifeng Du**

Supporting Information

Transformation from magnetic soliton to skyrmion in a monoaxial chiral magnet

Long Li, Dongsheng Song, Weiwei Wang*, Fengshan Zheng, András Kovács, Mingliang Tian, Rafal E. Dunin-Borkowski and Haifeng Du**

L. Li, Prof. D. Song, Prof. W. Wang, Prof. M. Tian, Prof. H. Du
Anhui Key Laboratory of Condensed Matter Physics at Extreme Conditions, High Magnetic Field Laboratory, HFIPS, Anhui, Chinese Academy of Sciences, Hefei 230031, China
E-mail: dsong@ahu.edu.cn; wangweiwei@ahu.edu.cn; duhf@hmfl.ac.cn

L. Li, Prof. M. Tian, Prof. H. Du
University of Science and Technology of China, Hefei 230026, China

Prof. D. Song, Prof. F. Zheng, Dr. A. Kovács, Prof. R. E. Dunin-Borkowski
Ernst Ruska-Centre for Microscopy and Spectroscopy with Electrons and Peter Grünberg Institute, Forschungszentrum Jülich, 52425 Jülich, Germany

L. Li, Prof. D. Song, Prof. W. Wang, Prof. H. Du
Information Materials and Intelligent Sensing Laboratory of Anhui Province, Key Laboratory of Structure and Functional Regulation of Hybrid Materials of Ministry of Education, Institutes of Physical Science and Information Technology, Anhui University, Hefei 230601, China

Prof. F. Zheng
Spin-X Institute, Electron Microscopy Center, School of Physics and Optoelectronics, State Key Laboratory of Luminescent Materials and Devices, Guangdong-Hong Kong-Macao Joint Laboratory of Optoelectronic and Magnetic Functional Materials, South China University of Technology, Guangzhou, China

Prof. M. Tian, Prof. H. Du
Science Island Branch of Graduate School, University of Science and Technology of China, Hefei, Anhui 230026, China

Prof. M. Tian
School of Physics and optoelectronics engineering, Anhui University, Hefei 230601, China

Keywords: skyrmion; chiral soliton lattice; Dzyaloshinskii–Moriya interaction; topological magnetic transition

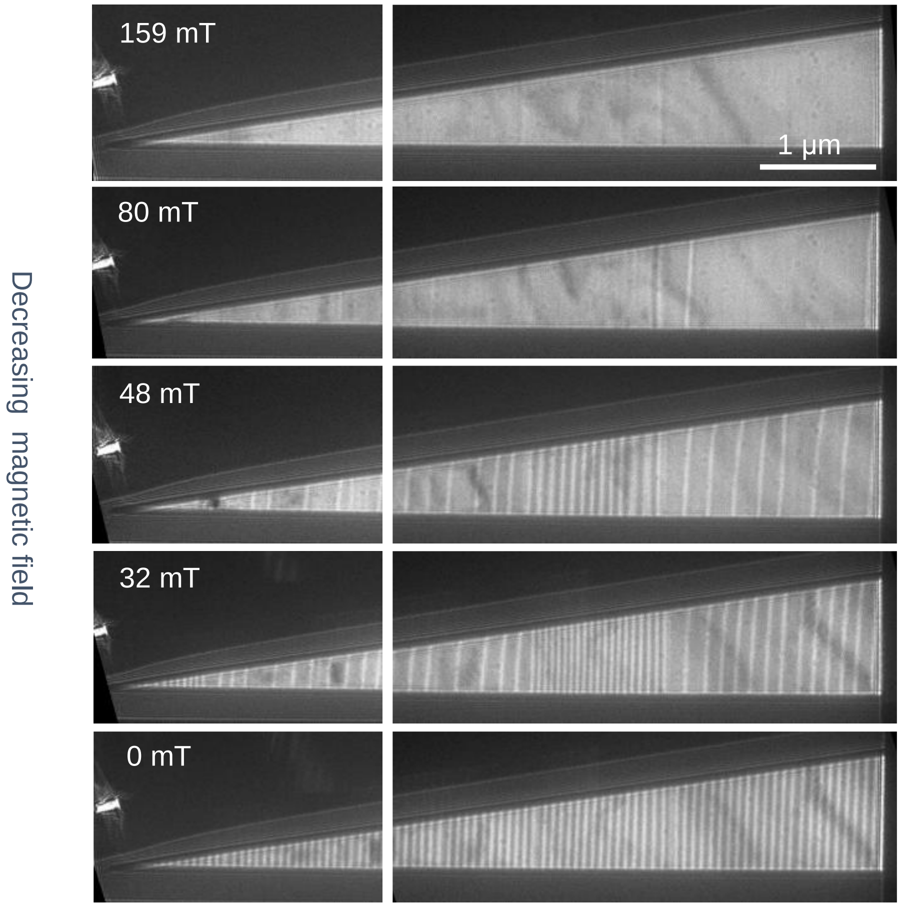

Figure S1. Magnetic evolution of magnetic solitons in a wedge-shaped $CrNb_3S_6$ nanostripe during the decrease of magnetic fields from the saturated states at T = 95 K.

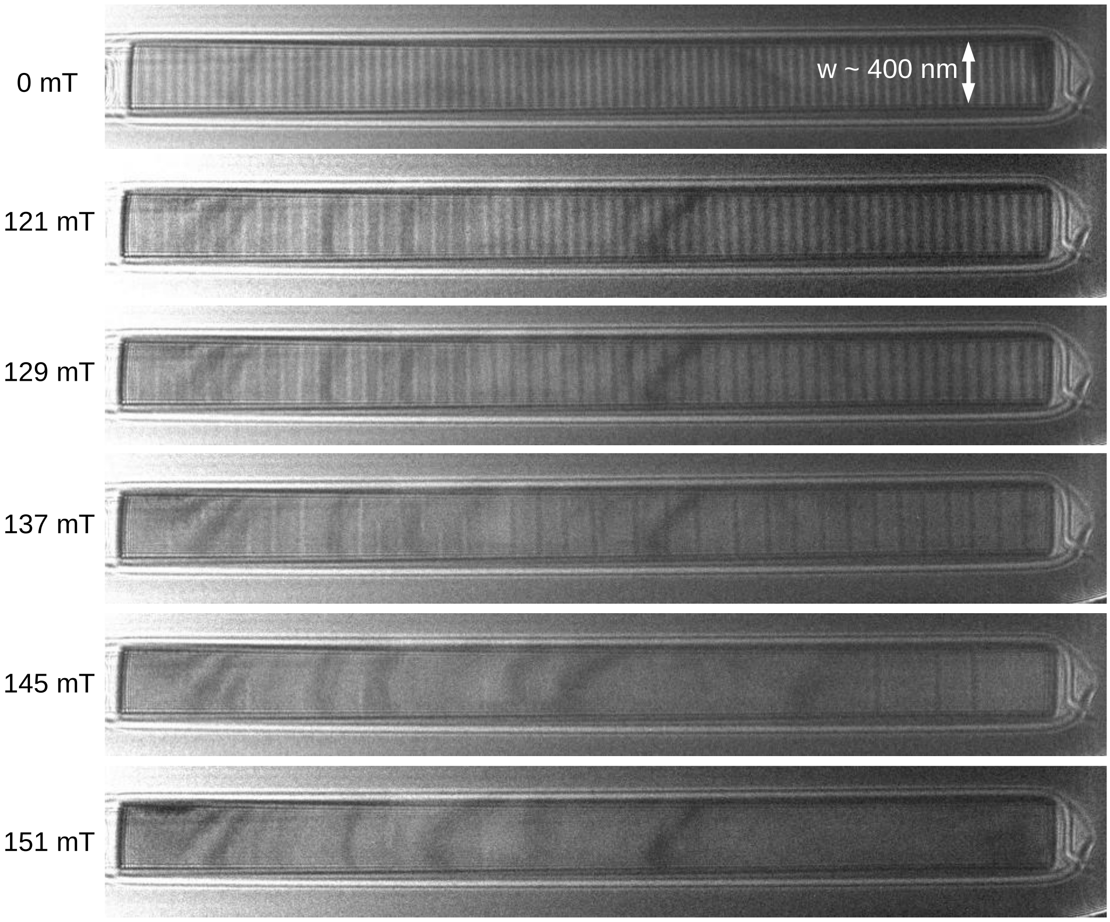

Figure S2. Magnetic evolution of magnetic solitons in a $CrNb_3S_6$ nanostripe in the presence of magnetic fields applied normal to the specimen plane at T = 95 K. The width of the nanostripe is approximately 400 nm.

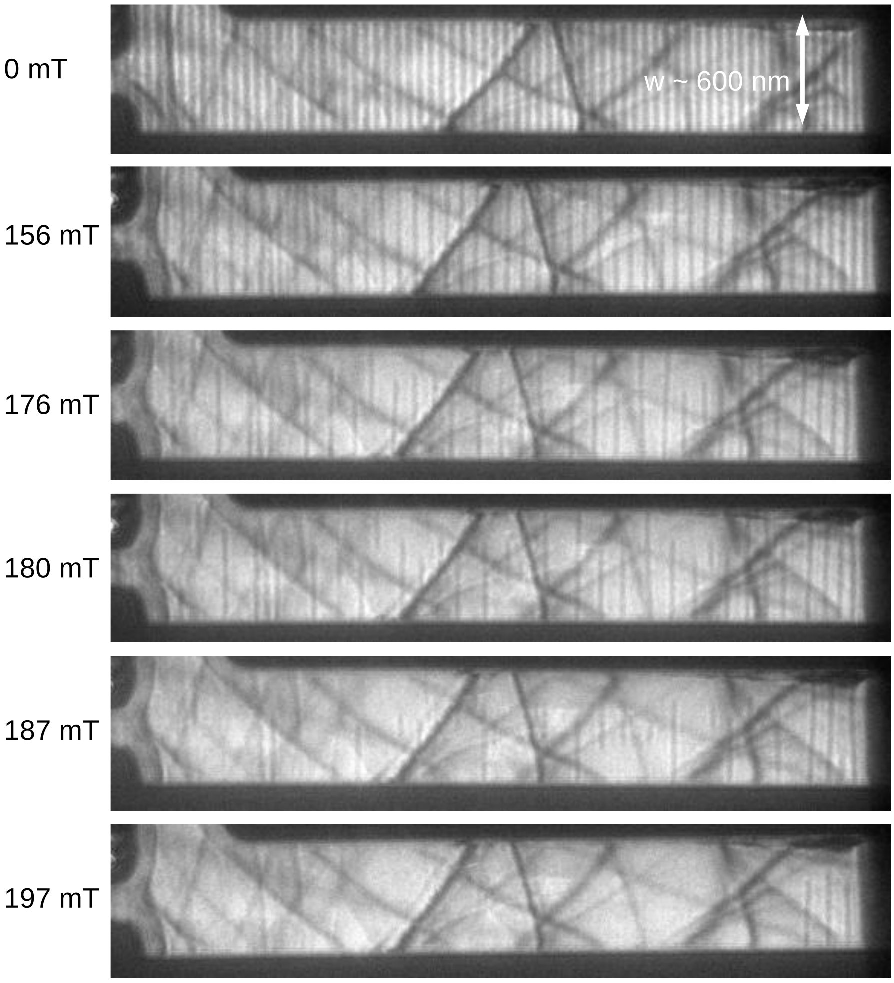

Figure S3. Magnetic evolution of magnetic solitons in a $CrNb_3S_6$ nanostripe in the presence of magnetic fields applied normal to the specimen plane at T = 95 K. The width of the nanostripe is approximately 600 nm.

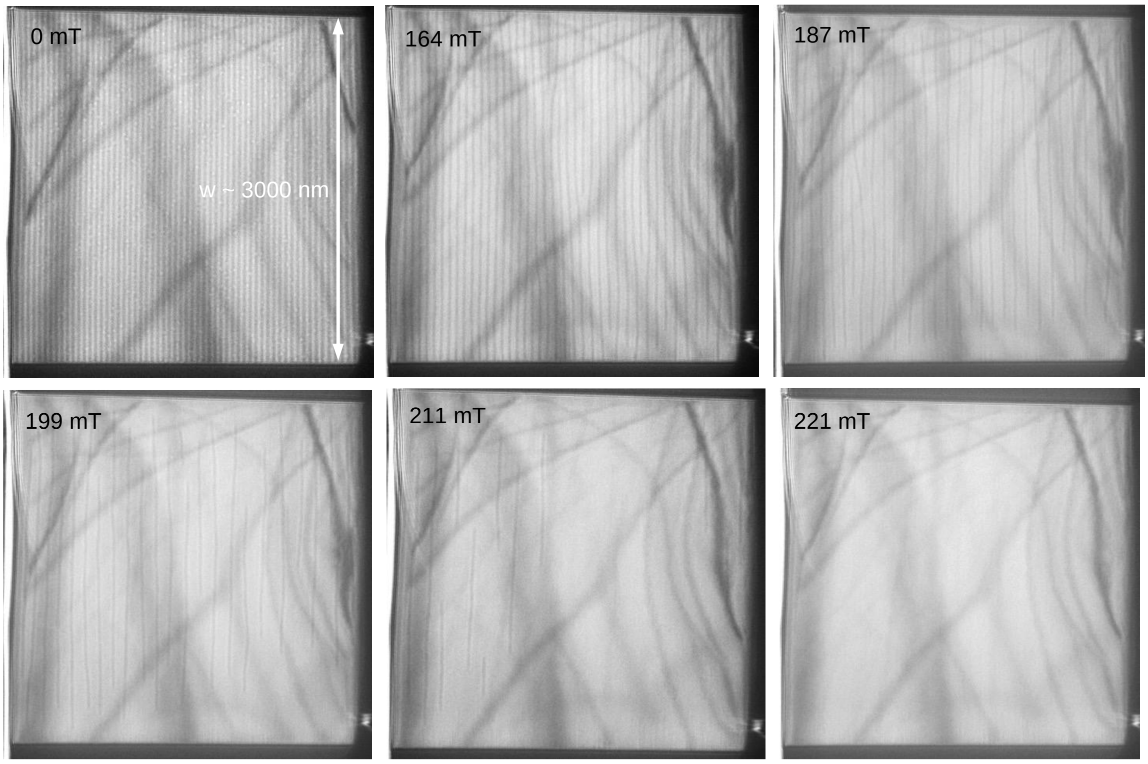

Figure S4. Magnetic evolution of magnetic solitons in a $CrNb_3S_6$ nanostripe in the presence of magnetic fields applied normal to the specimen plane at $T = 95$ K. The width of the nanostripe is approximately 3000 nm.

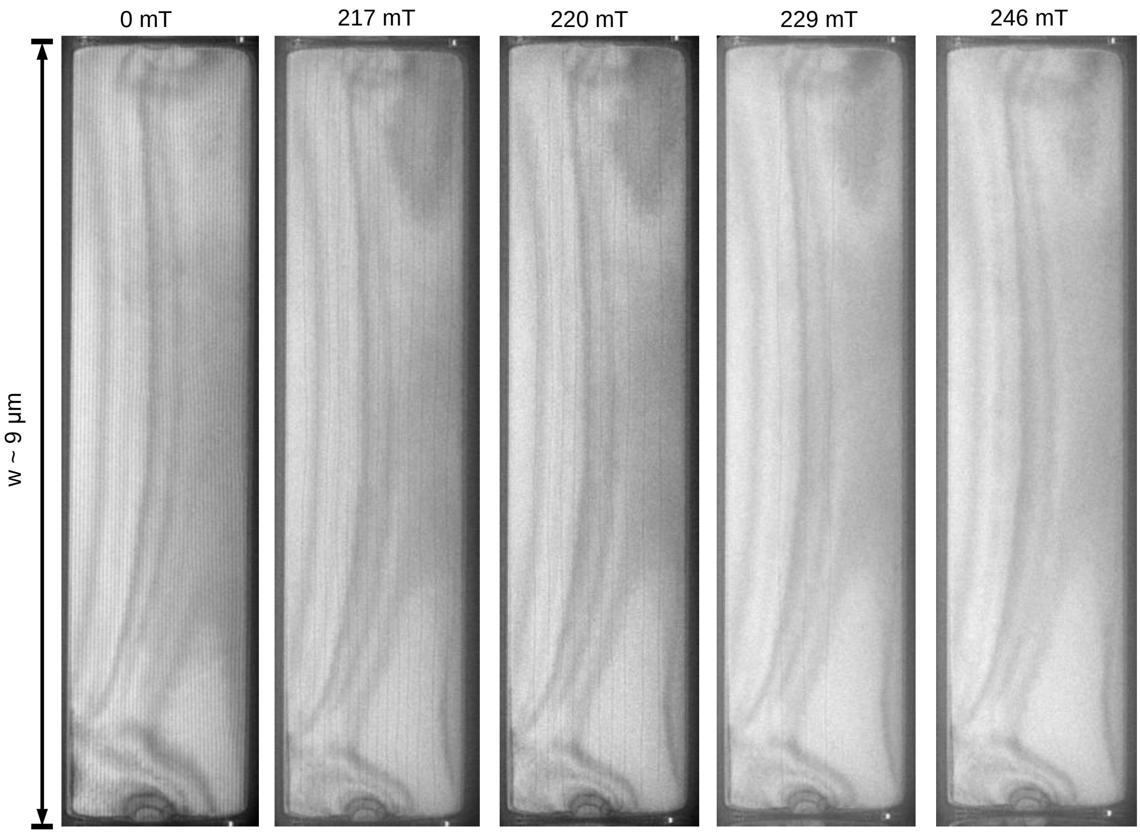

Figure S5. Magnetic evolution of magnetic solitons in a $CrNb_3S_6$ nanostripe in the presence of magnetic fields applied normal to the specimen plane at T = 95 K. The width of the nanostripe is approximately 9000 nm.

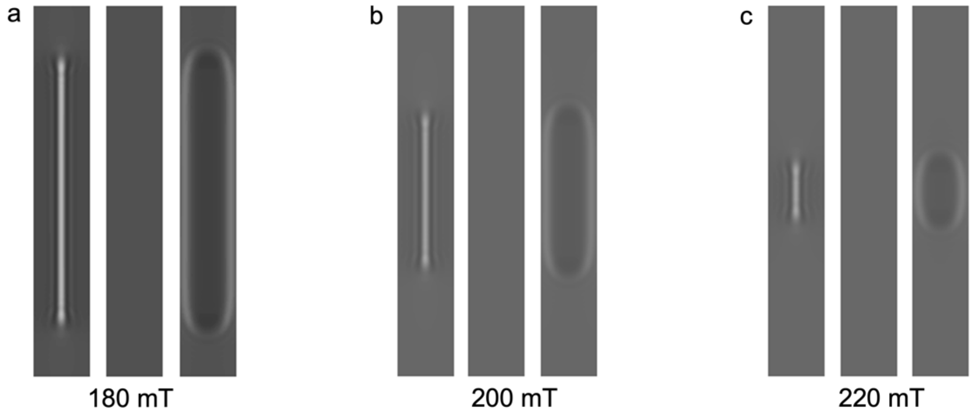

Figure S6. Simulated Lorentz Fresnel images of the elongated skyrmions under different magnetic fields. The spin configurations are based on the output from the micromagnetic simulations. The simulations were conducted with the accelerating voltage of 300 kV and the defocus values of +100 μm, 0 and -100 μm, respectively. The image contrast are similar to the experimental observations.

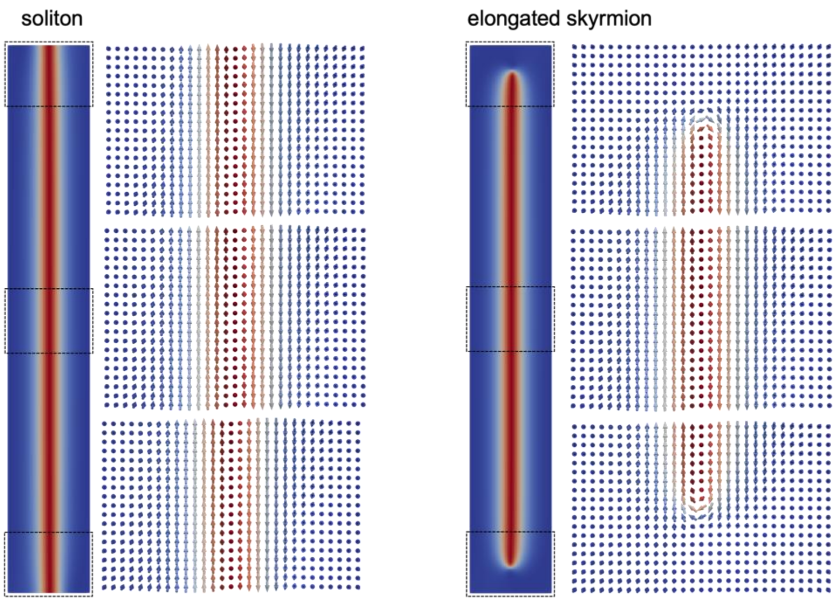

Figure S7. Spin configurations of magnetic soliton (left) and elongated skyrmion (right). The top, middle and bottom parts (indicated with dotted boxes) are enlarged to clarify the difference of the spin textures between soliton and elongated skyrmion.