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Science 4.0 approach for sample preparation

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The first industrial revolution enabled mass production by using steam power in the late 18th century. Progress continued by adding electricity and programmable logic controllers in the second and third industrial revolution, respectively. All this two-century progress was more-less irrelevant for science since progress there requires constant changes and our invention. We are now on the threshold of the fourth industrial revolution, which will bring smart factories by utilizing big data and artificial intelligence. Such techniques are, for the first time in mankind's history, also beneficial for science.

A persistent problem with inelastic neutron scattering is the need to use a sample with a minimum mass of hundreds of milligrams. For many samples it could be only achieved by co-aligning more single crystals. This process is very time-consuming and often not very precise (e.g. [1]). We will present you the newly constructed Automatic Laue Sample Aligner - **ALSA**, which will automatize the crystal co-alignment process by using a state-of-the-art X-Ray Laue diffractometer, robotized manipulators, real-time computer vision, and bespoke neural network software for crystal placing and Laue pattern solving. The device ALSA will be a true game-changer in the field of inelastic neutron scattering because it will drastically speed up sample preparation.

[1] Duan, C. Et al. Nature 600, 636–640 (2021). doi:10.1038/s41586-021-04151-5

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