**ANNEX NO. 4 OF DOCUMENTATION OF THE PROCUREMENT PROCEDURE**

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**SPECIFICATION OF THE PUBLIC CONTRACT SUBJECT**

The subject of the public contract shall meet the following requirements for technical parameters and equipment:

The direct electron detection 4D-STEM system is required to enhance JEOL JEM2200FS electron microscope. The supply should include camera, scan generators, and other hardware required for the interoperability of the camera with the microscope, software and installation. The new system should be compatible with the electron microscope JEOL JEM2200FS, including the omega-type energy filter. The new installation should not deteriorate the resolution of the existent imaging system (4096×4096 px resolution,<0.005% defective pixels, no clusters, 30px edges excluded from count, at least 24 fps at 1× binning, 190 fps at 8× binning, at least 16-bit readout, precession imaging (with or without scan), 80–200 kV electron sensitivity).

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| **Technical specification – Direct detection camera** | | |
| **Designation of the delivery (min. brand and type)** | |  |
| **Individual technical parameters of the performance** | | **Data about the offered performance** |
| 1 | hybrid pixel detector |  |
| 2 | at least 512×512 px resolution (<0.03% defective pixels) | ***and will enter the actual values*** |
| 3 | pixel size > 50 µm | ***and will enter the actual values*** |
| 4 | 80–200 kV electron sensitivity |  |
| 5 | both event-based and frame-based readout |  |
| 6 | at least 2 ns time resolution and 100 Mhit/s event rate in event readout mode | ***and will enter the actual values*** |
| 7 | radiation-hard detector (no electron beam damage without beam stop) |  |
| 8 | external signal time-stamping (TDC) |  |
| 9 | external shutter |  |
| 10 | counts, ToA, ToT data output |  |
| 11 | >500MHz effective frame rate | ***and will enter the actual values*** |

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| **Technical specification**­­ **­– Scan generator** | | |
| **Designation of the delivery (min. brand and type)** | |  |
| **Individual technical parameters of the performance** | | **Data about the offered performance** |
| 1 | at least 4 inputs for analog signals (BF, DF, HAADF, …) | ***and will enter the actual values*** |
| 2 | at least 4k × 4k px scan resolution | ***and will enter the actual values*** |
| 3 | minimum dwell time < 200 ns | ***and will enter the actual values*** |
| 4 | external scan input |  |
| 5 | external synchronization output |  |
| 6 | preset scan patterns  user programmable pixel set and hold times,  user programmable pixel, line, frame trigger |  |

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| **Technical specification**­­ **­– Software** | | |
| **Designation of the delivery (min. brand and type)** | |  |
| **Individual technical parameters of the performance** | | **Data about the offered performance** |
| 1 | live preview of the camera image |  |
| 2 | acquisition of camera still images |  |
| 3 | acquisition of camera image sequences (videos) using automatic or external triggering |  |
| 4 | live preview of 4D-STEM data |  |
| 5 | acquisition of full 4D-STEM data |  |
| 6 | acquisition of raw event stream |  |
| 7 | data export to open or well-documented formats |  |
| 8 | possibility of scripting and custom data processing |  |
| 9 | acquisition of (STEM)EELS data |  |
| 10 | drift correction |  |
| 11 | image processing and analysis |  |

Instructions for the participants:

*The participant fills in the data in the “Data about the offered performance” column, indicating for each item whether the performance offered by him meets the relevant request of the contracting authority (“****YES****”) or does not (“****NO****”).*