

Development of Scintillator Detectors and Gas-based Detectors at J-PARC/MLF

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We have developed scintillator detectors and gas-based detectors for beam lines of Materials and Life Science Facility (MLF) at J-PARC.

As for scintillator detectors, developed are one-dimensional fiber-coded type detectors and two-dimensional detectors using wavelength shifting fibers (WLSF). The 1-D detectors have performances such as a position resolution of 3 mm, 360 pixels per detector, neutron detection efficiency of $> 50\%$ at 1 \AA , and gamma sensitivity of $< 10^{-6}$ at 1.3 MeV, where the detectors were developed under international collaboration with Rutherford Appleton Laboratory, UK. Total 10 detectors have been installed at engineering material diffractometer (BL19) for residual stress analysis. Two types of 2-D detectors using WLSF techniques have been developed for biological crystal diffractometer (BL03) and single crystal diffractometer (BL18). Detectors for BL03 have performances such as a pixel size of $0.5 \times 0.5 \text{ mm}^2$, a detection area of $133 \times 133 \text{ mm}^2$, neutron detection efficiency of 50% at 1.8 \AA , and gamma sensitivity of 1×10^{-6} . Total 30 detectors of this type have been installed at BL03. On the other hand, detectors for BL18 have performances such as a pixel size of $4 \times 4 \text{ mm}^2$, a detection area of $256 \times 256 \text{ mm}^2$, neutron detection efficiency of 40% at 1.8 \AA , and gamma sensitivity of 3×10^{-6} . Total 37 detectors have been installed at BL18.

As for gas-based detectors, a multi-wire proportional counter (MWPC) with the readout system have been developed and installed at polarized neutron reflectometer (BL17). The MWPC has a pressure vessel withstanding up to 8 atmospheres, a multi-wire type detector element with wire pitch of 1mm. The sensitive area was $128 \times 128 \text{ mm}^2$. The MWPC readout system adopted individual line readout system to establish high counting capability and high position resolution.

In this report, detailed characteristics with some experimental results of these detectors will be presented.