

## New hybrid detector monitors alpha, beta, and gamma radiation simultaneously

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By combining three layers of detection into one new device, a team of researchers from Japan has proposed a new way to monitor radiation levels at power plant accident sites. The device would be more economical that using different devices to measure different types of radiation, and could limit the exposure times of clean-up workers by taking three measurements simultaneously. Radioactive decay produces three flavors of emissions: alpha, beta, and gamma.

Alpha particles comprise 2 neutrons and 2 protons. Because of their large mass and relatively slow speed, <u>alpha particles</u> are the least penetrating of the three types of radiation, and can be stopped by a sheet of paper. Beta particles are electrons that can travel farther than alpha particles, but not as far as high-energy gamma photons, the third type of radiation. The researchers took advantage of the different penetrating properties of the three types of radiation to design their device. Their new radiation detector has three scintillators, which are sheets of material that light up when hit by radiation. Alpha particles strike only the first scintillator, beta particles travel on to the second scintillator, and gamma photons make it all the way through to the third scintillator.

The scintillators were then coupled to a photomultiplier tube, a device that converts the light pulses into electrical current. Because the shape of a <u>light pulse</u> differs depending on which type of radiation produced it (alpha particles produce sharp peaks, gamma particles more broad pulses), the device could distinguish between the different radiation types and produce counts for all three simultaneously. The new device



could be used for a range of applications in which scientists might need to determine the types of radioactive material present, the researchers write.

**More information:** "Development of an alpha/beta/gamma detector for radiation monitoring" is accepted for publication in *Review of Scientific Instruments*.

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