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PET/MR Scanner Development Project on Course

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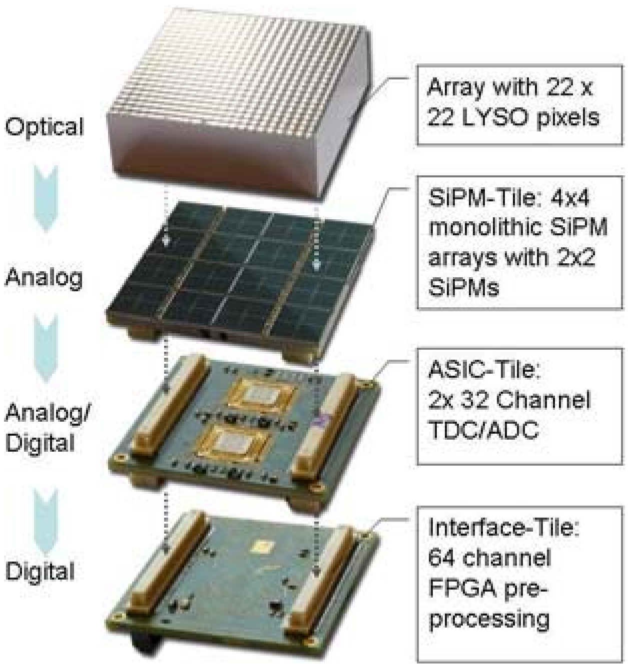

Combining PET and MRI scanning into one machine has great potential for comprehensive imaging of the body. Modern gamma ray detectors use vacuum photomultiplier tubes which are sensitive to magnetic fields, so a major goal of the project was to overcome this limitation. **Philips**, the leader of HYPERImage, the multi-institution European project to create a PET/MR machine, is announcing considerate success toward its goal.

The milestone that the HYPERImage team has reached is the development of a functional gamma-ray detector that meets the performance requirements of the latest time-of-flight PET scanners. The new gamma-ray detectors have been designed to be compatible with the strong static and dynamic magnetic fields that would be present in a combined PET/MR scanner. Furthermore, the team has achieved major progress with respect to MRI-based static and dynamic PET attenuation correction. Details of these results are presented at the IEEE Nuclear Science Symposium and Medical Imaging Conference, which takes place on October 25-31 in Orlando, Florida, USA.

More about the project from the backgrounder:

The technical breakthrough behind the team's development of an MR-compatible gamma-ray detector is the development of a new solid-state, scalable and compact digital detector technology. This technology is based around silicon photomultiplier arrays that offer the desired sensitivity, energy resolution and timing resolution required for time-of-flight PET measurements, and that feature integrated digital read-out electronics.

To increase the effective sensitivity, and to reduce the scan-time and dependence of sensitivity on patient size, the detector has been designed to support time-of-flight PET measurements with extremely short coincidence time resolution. In time-of-flight PET scanners, not only the direction of the gamma ray paths is measured but also the difference in time it takes the pair of gamma rays generated by the PET tracers to reach the detector. This time difference measurement substantially increase the precision with which the tracer can be localized. Time-of-flight measurements increase the effective sensitivity by a factor 10 compared to standard systems.

The silicon photomultiplier array's integrated digital read-out electronics contain a low-jitter and low-power signal acquisition unit. Low power consumption is an essential requirement when preparing the technology for integrated whole body scanning applications.