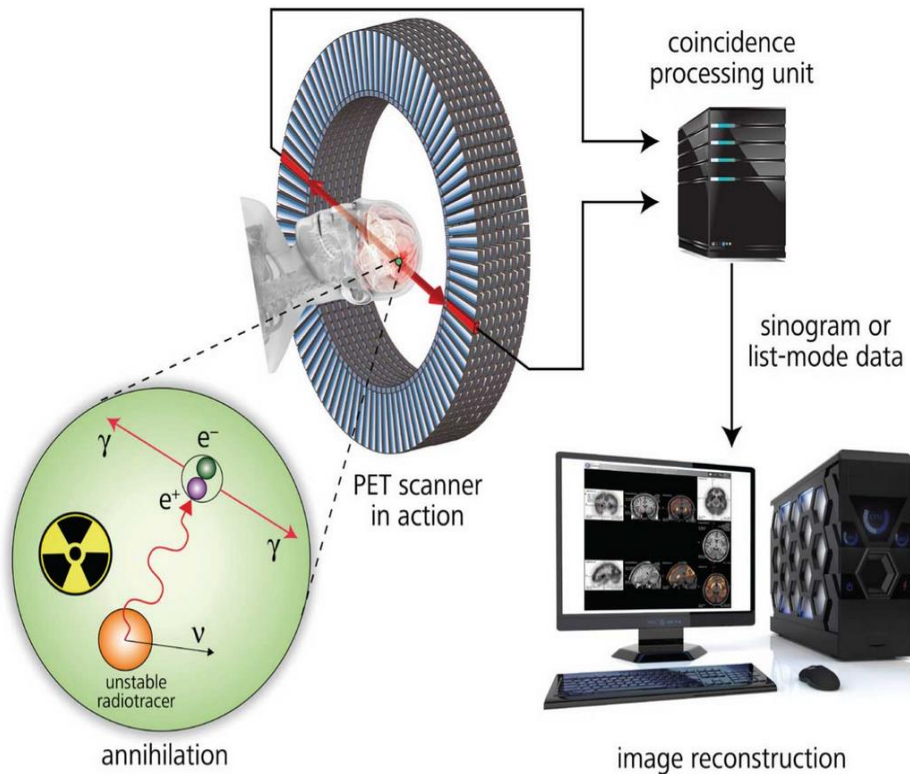


PET/MR System

TEAM E
(ICSL, RDMIS)

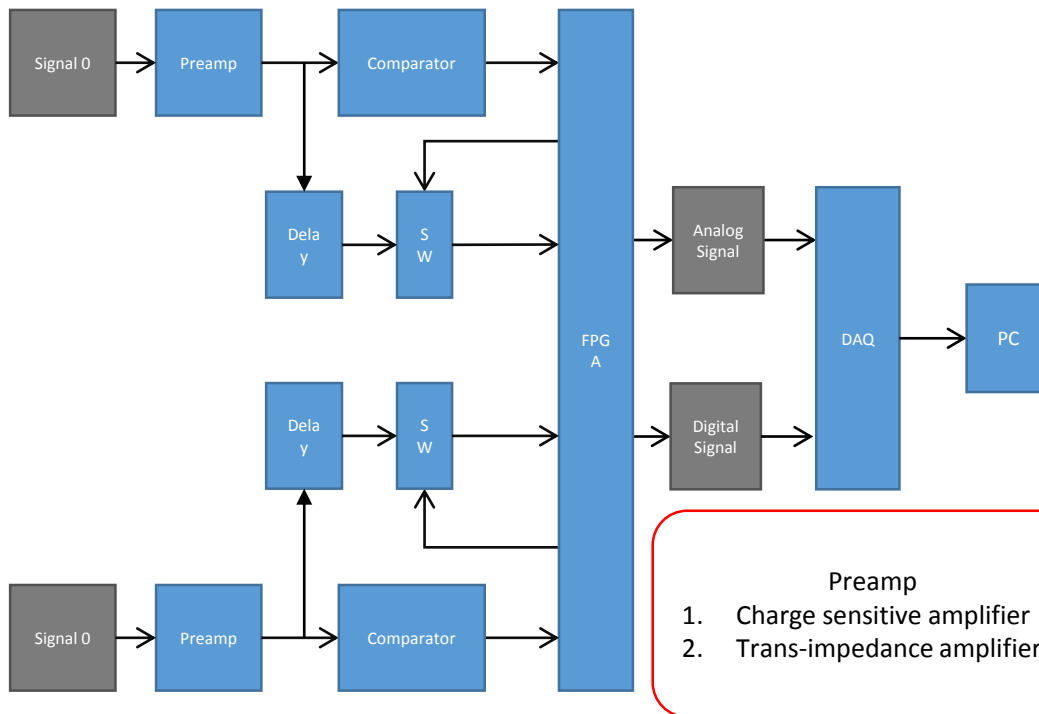
Principle of PET



- Injected radioisotope undergoes positron emission decay
- The emitted positron travels in tissue for a short distance and it can interact with an electron.
- A pair of annihilation photons moves in approximately opposite directions.
- It is possible to localize their source along a straight line of coincidence
- It calls line of response (LOR). Accumulating LOR, we can find annihilation point.

Position decoding ASIC (TIA)

Diagram of PET



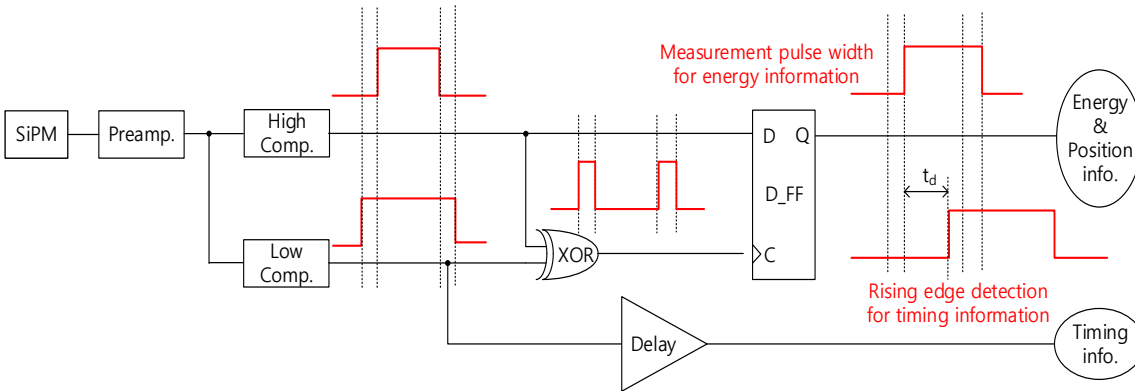
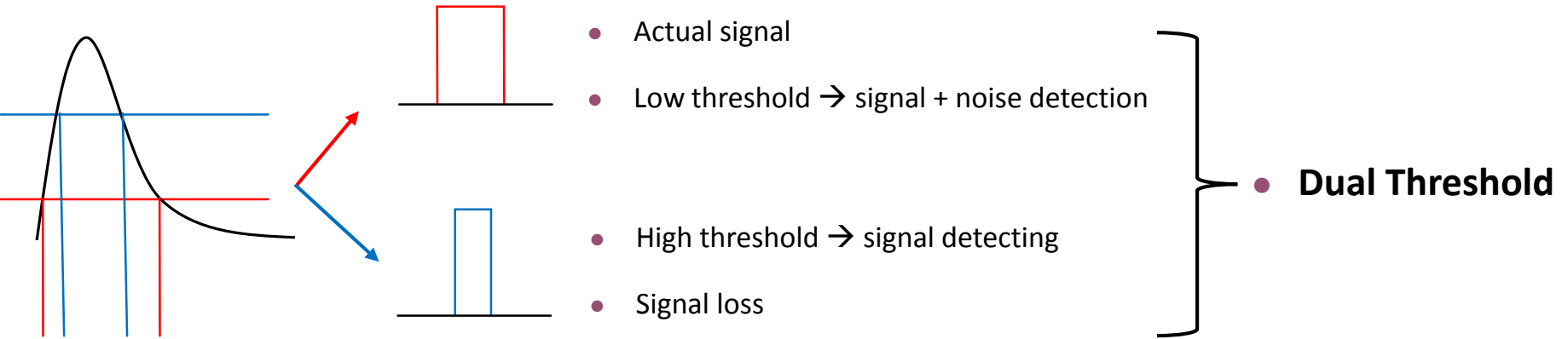
Charge Sensitive Amplifier

- Sensing the charge which stack in the capacitor
- Capacitance \leftrightarrow Preamp Gain
- Not suitable for ASIC

Trans-impedance Amplifier

- Low Gain, Noise
- Use of Resister
- RGC TIA \rightarrow Suitable for ASIC

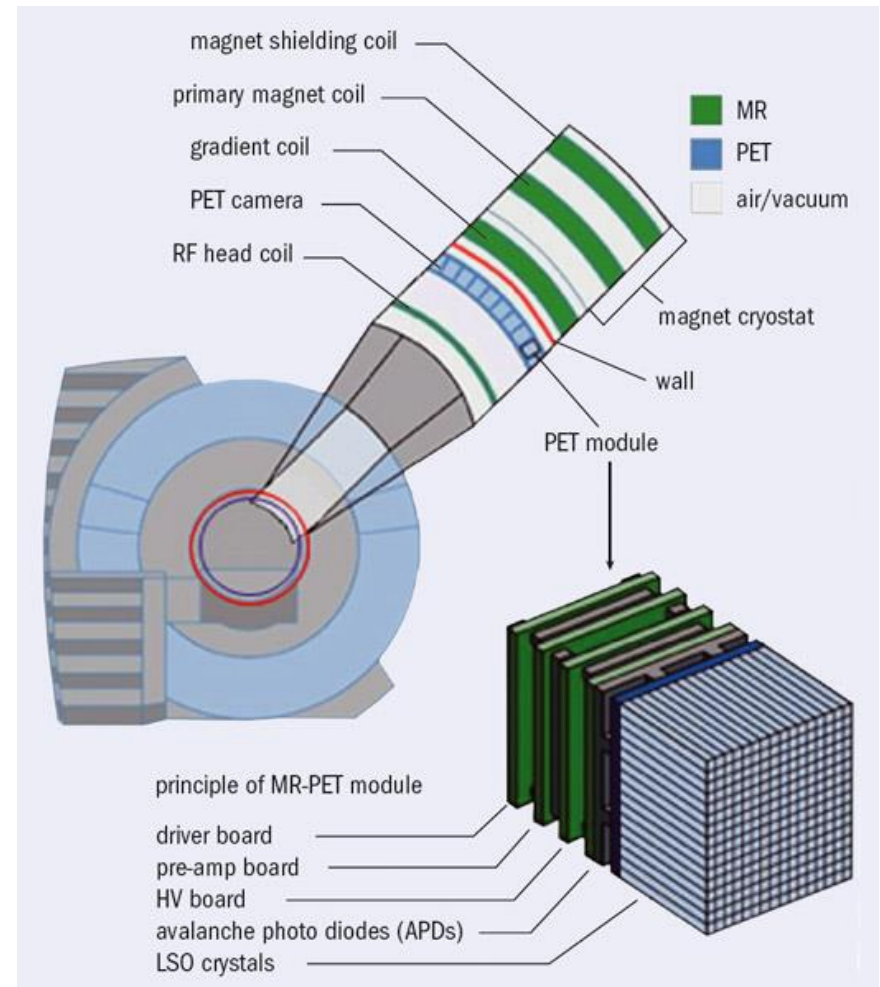
Position decoding ASIC (DT)



- Simplifying the system
- Reduction of signal distortion
- Valid signal & energy acquisition
- ASIC suitable

■ Drawback of PET/MR system^[1]

- Field inhomogeneity
- Eddy currents
- Radiofrequency shielding
- Coil loading
- Mechanical vibration
- Temperature
- Interference
- Gamma attenuation



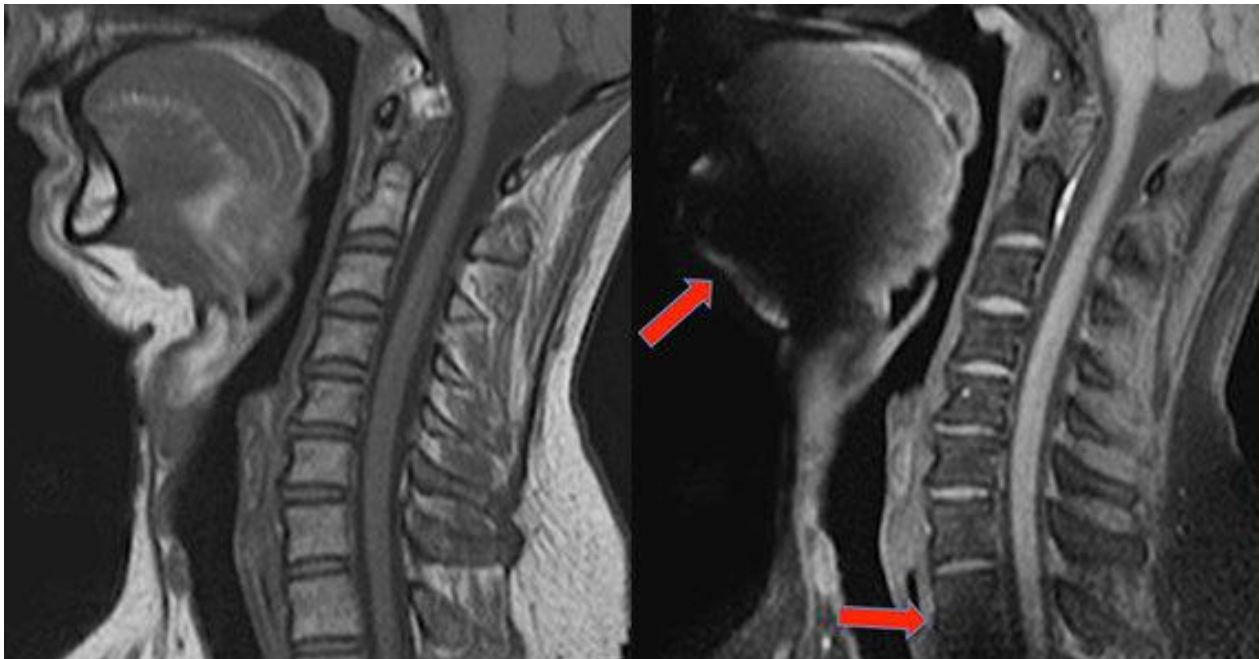
[1] Carrio, Ignasi, and Pablo R. Ros, eds. *PET/MRI: Methodology and Clinical Applications*. Springer Science & Business Media, 2013.

■ Drawback of PET/MR system^[1]

- Fat saturation/suppression
 - Fat saturation method can be effected B0 and B1 field inhomogeneity.
 - Chemical-shift based technique (ex. DIXON method) can be a good alternative way to suppress the fat signal.
 - Current work-flow takes a lot of time to acquire entire data.

T1 weighted

Fat Sat.



■ A fat water-fat separation method

- Concept of proposed method
 - There is similarity of multi-echo time images, which means redundancy among each data.
 - Similarity of multi-echo time data means that there is low-rankness in k-space domain.

