Conceptual design of the Radial Gamma Ray Spectrometers (RGRS) system for alpha particle and runaway electron measurements at ITER

- Designed to study \textit{\alpha\ particle and runaway electrons} using spontaneous gamma-ray emission from the plasma
- \textit{\alpha\ particles} are measured by observation of \textit{4.44 MeV gamma-rays from $^9\text{Be}(\alpha,n\gamma)^{12}\text{C}$ reactions}. $^9\text{Be}$ is a naturally occurring impurity from the erosion of the first wall.
- Confined and de-confined \textit{runaway electrons} are measured by observation of the corresponding hard x-ray emission
- \textbf{Multiple sight-lines} provide spatial coverage of the \textbf{core region ($r < a/3$)} of the plasma
- The design is \textbf{integrated with the ITER Radial Neutron Camera} and is based on the successful experience with gamma-ray measurements at the \textbf{JET tokamak}
- \textbf{A time resolution of about 0.1 s} for spectral measurements of gamma-ray emission from \textit{\alpha\ particles} and runaway electrons can be achieved, thus fulfilling ITER requirements.

4.44 MeV gamma-ray emissivity [$\gamma/m^3/s$] for the 500 MW DT ITER scenario

Lines of sight of the RGRS system in the poloidal plane