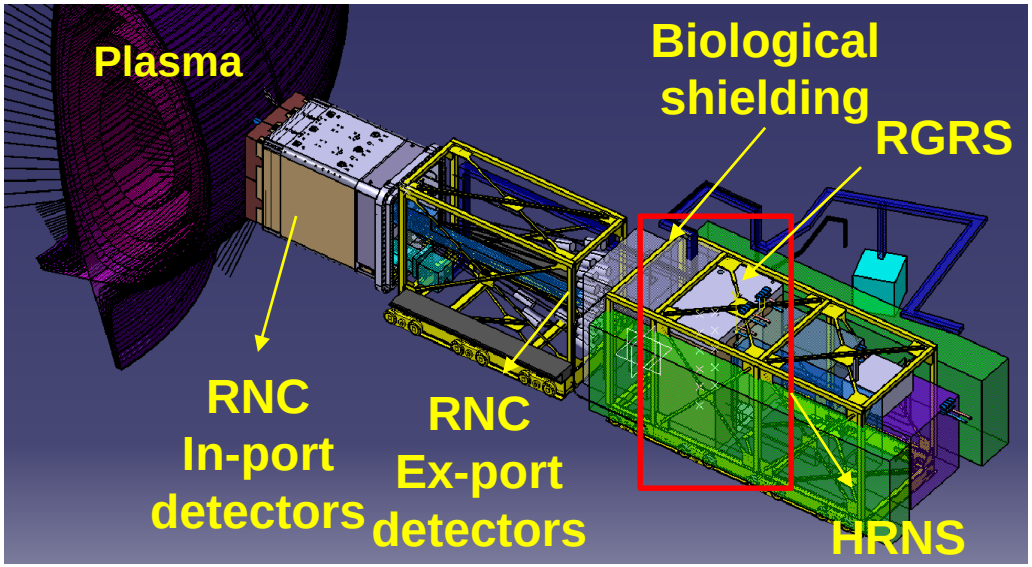
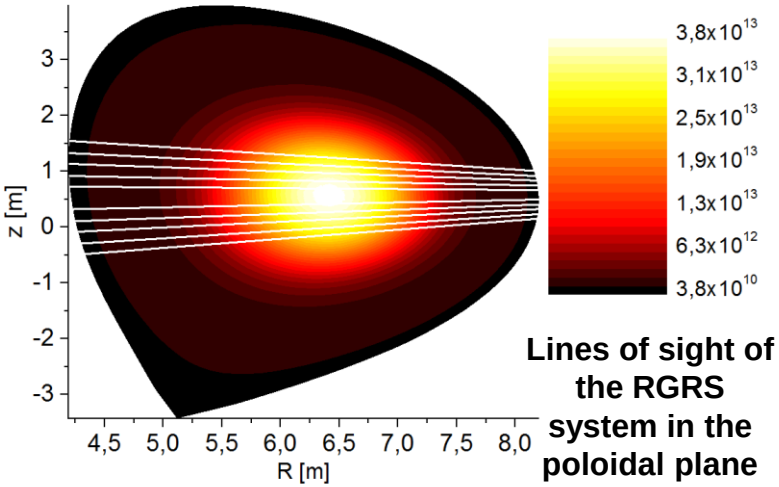
Conceptual design of the Radial Gamma Ray Spectrometers (RGRS) system for alpha particle and runaway electron measurements at ITER



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

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