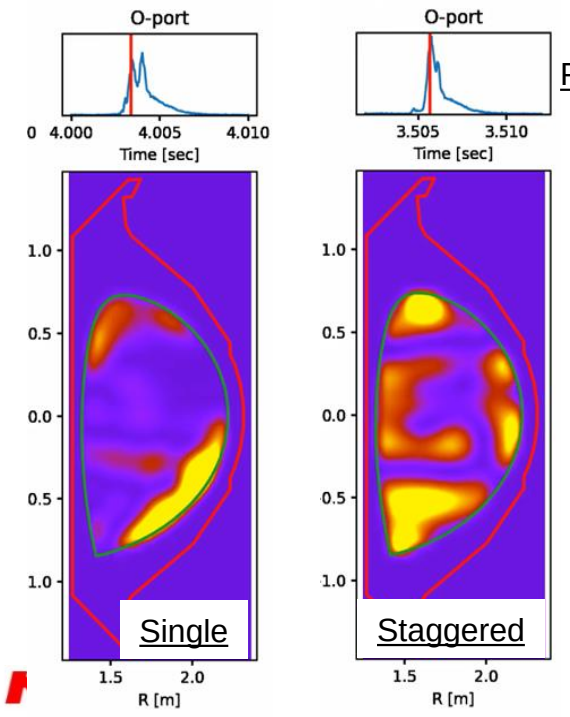
High-density dilution-cooled plasma formed by the preceding D_2 pellet showed a tendency to toroidally localize the radiation by the following Ne-doped pellet.

- We need low Z D_2 injection to avoid runaway electrons, and high Z neon injection to radiate stored energy.
  - Single injection: Ne+D_2 mixture pellet (e.g., Ne:D = 10:90)
  - Staggered injection: pure D_2 pellet followed by Ne+D_2 mixture pellet
- However, staggered injection has not been fully tested.
  - Pure D_2 pellet creates a completely different target discharge.
    - ~One order higher density and ~one order lower temperature
  - The effect of following Ne+D_2 mixture pellet can be totally different.
    - Amount of assimilation
    - Total radiated power and asymmetry of radiated power



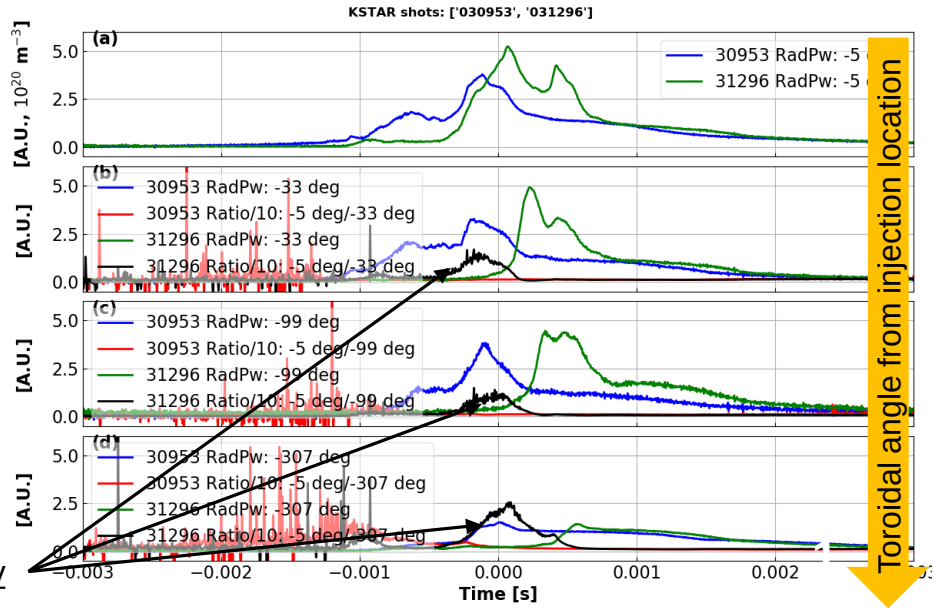
Poloidal radiation pattern near injection location

- Dual SPIs and disruption-compatible diagnostics in KSTAR
  - Multi-barrel SPIs in toroidally opposite locations → staggered injection
  - Toroidal/poloidal bolometer arrays → toroidal/poloidal radiation patterns
  - Short wavelength interferometer → very high density measurement
- Radiation pattern in staggered injection is very different.
  - During the time when the radiation is strongest, toroidal radiation at a point that is only 33 degrees away differs by ~10 times.
  - When considering the strategy of staggered injection in ITER DMS, the radiation peaking problem must be included with its assimilation rate.
  - On the other hand, poloidal radiation is less localized compared to that of single injection of Ne-doped pellet.
  - Even if it is not the intended staggered injection, staggered injection can occur due to several uncontrollable factors in multi-pellet injection.

Single vs. staggered injection

#30953 (blue traces): single scheme
10% neon pellet only

#31296 (green traces): staggered scheme
Pure D_2 pellet followed by 10% neon pellet
~1 ms time delay between two pellets



High toroidal asymmetry