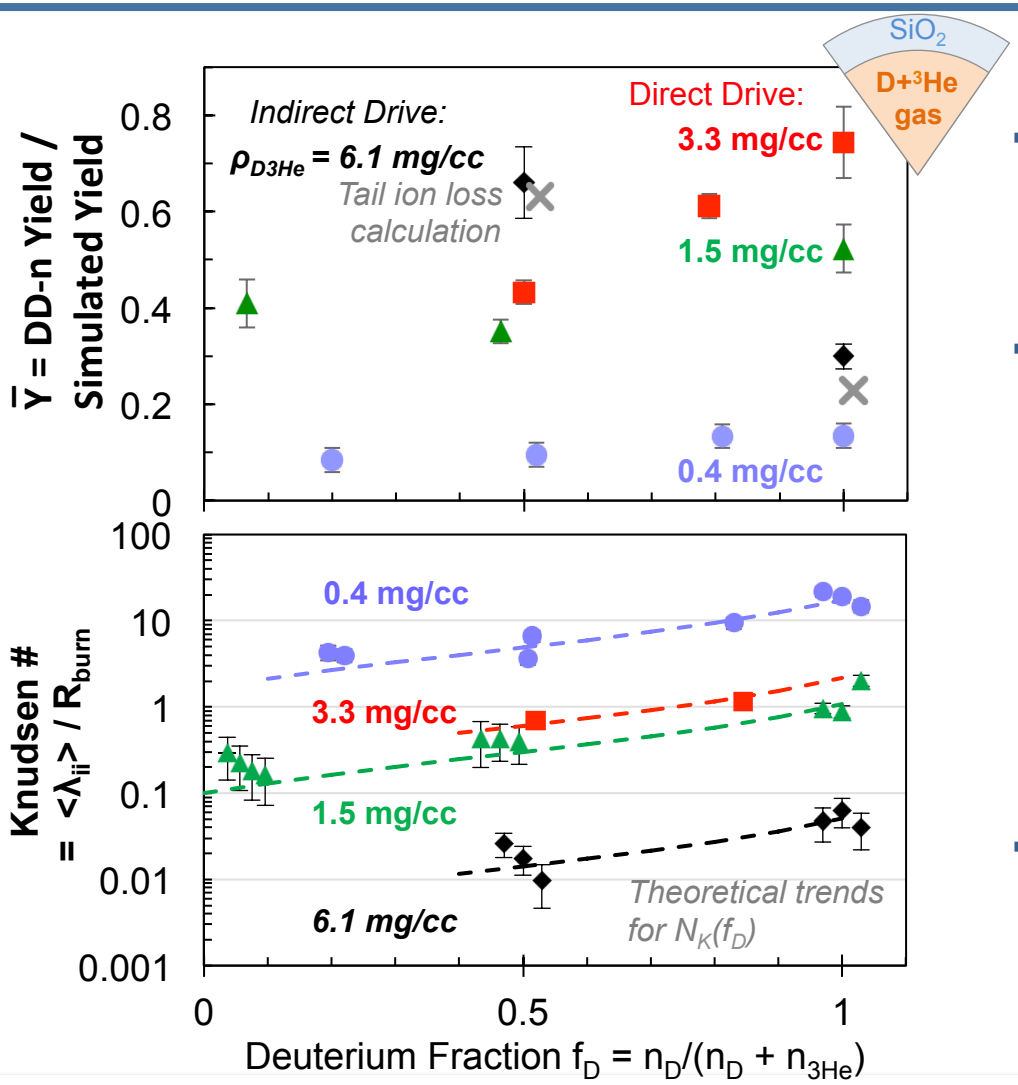
Ion kinetic physics mechanisms impact plasmas relevant to shock-phase DT-vapor in ICF experiments



- Strongly shocked (M > 10), low-density (ρ ~ 1 mg/cc), hot (T_i > 1 keV) plasmas are produced in laser-driven capsule implosions to study the effects of *long mean-free-paths* (**$N_K = \lambda_{ii}/R > 0.01$**) and *multiple ion species.*
- Trends in nuclear performance are dominated by different effects in three regimes of N_K:
  - **$N_K < 0.1$**: Nuclear yield matches predictions of reactivity reduction due to suprathermal "tail" ion loss.[1] *Trend:* $\bar{Y}(f_D = 1) < \bar{Y}(f_D = 0.5)$
  - **$0.1 < NK \approx 1$:** Nuclear data implies separation of D, ^{3}He by diffusion.[2] $\bar{Y}(f_D = 1) > \bar{Y}(f_D = 0.5)$
  - **$NK >> 1$:** Ion temperatures imply thermal decoupling of D, ^{3}He.[2] $\bar{Y}(f_D = 1) > \bar{Y}(f_D = 0.5)$
- During shock-phase of ICF ignition implosions, DT-vapor has **$0.2 < N_K < 0.8$**, implying distributions are strongly non-thermal.

[1] *Albright POP 20, 122705 (2013); Kagan PRL 115, 105002 (2015)*
[2] *Rinderknecht PRL 114, 025001 (2014)*

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