Diagnostics should be excellent in order to serve the needs of a burning plasma science program

- Configuration flexibility, diagnostics, control tools help ensure success of this device and of a DEMO.
- A flexible, well diagnosed, scientifically focused BPX can inform science of innovative concepts, and might incorporate innovations developed off-line
- A flexible, well-diagnosed BPX will enable systematic studies that advance basic plasma physics

Our diagnostic plans should be commensurate with scientific needs

- There are many items that will always remain open until we actually build a BPX. It is important to then ask:
  - How can we get enough data to teach us what we need to know to advance ICC's, optimize a DEMO?

- Device has to provide enough data to
  - Ensure that its mission is fulfilled
  - Inform the science needed for ICC's
  - Inform the science needed for DEMO
  - Inform basic plasma science

- Is diagnostic set sufficient in terms of time & space resolution, and quantity measured, given what we know of
  - AT physics
  - Needs to address present urgent transport problems
  - Turbulence issues that are tested to the extreme in a BP

Desirable attributes regarding flexibility and measurements in a BPX include…

- Profile control tools
  - Localized heating
  - Current drive
  - Rotation/flow shear
  - Pumping
  - Pellets
- Diagnostics
  - q profile
  - Kinetic profiles; resolution
  - E_r
  - Core turbulence, low and high k
- Shaping

ITER-FEAT	FIRE	IGNITOR
NBI,ECH,LH,ICRF	ICRF,LH	ICRF
ECCD,LHCD,NB	LHCD,ICRF	----
NBI; RF?	RF?	RF
SN	DN	Limiter?
HFS	Vert, HFS	Vert, LFS

MSE(resolution, duration?) MSE(resolution?) ---

Full (resolution?) Full(beam upgrade?) Full (no beam)

----------To be discussed----------

<----listed; development level? priority?---->

---- more limited than present ATs----

Proposed points for discussion

- Will the key quantities regarded to be at the heart of critical transport physics issues be measured?
  - Consider especially how they pertain to the integration of alpha heating and P(r,t) dynamics

- Is the spatial and temporal resolution of the proposed set adequate to meet the needs of transport science? to fulfill the mission of the device?

- Is the program priority of key transport diagnostics about right, in your view, or not?

Presentations/discussion

- Scientific requirements: Doyle (20 min)
  - Discussion (10 min)
- ITER: Campbell (10 min)
  - Discussion (10 min)
- FIRE: K. Young (10 min)
  - Discussion (10 min)
- Ignitor: Bombarda (10 min)
  - Discussion (10 min)