

CONF-8510266--4

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**MASTER**

## CONTINUOUS PELLET FUELING EXPERIMENTS ON D-III

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Presented by  
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Oak Ridge National Laboratory \*

## INTERNATIONAL PELLET FUELING WORKSHOP

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*Jaw*

**RESULTS OF CONTINUOUS PELLET  
FUELING EXPERIMENTS ON DOUBLET III**

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**R. Stockdale, D. Schissel, S. Wojtowicz,**

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**D. Knowles, J. Baur - GA Technologies**

**Presented by C. A. Foster - ORNL**

A centrifuge pellet injector developed at ORNL was used to continuously fuel beam-heated limiter discharges in D-III.

The pellet injector capabilities were:

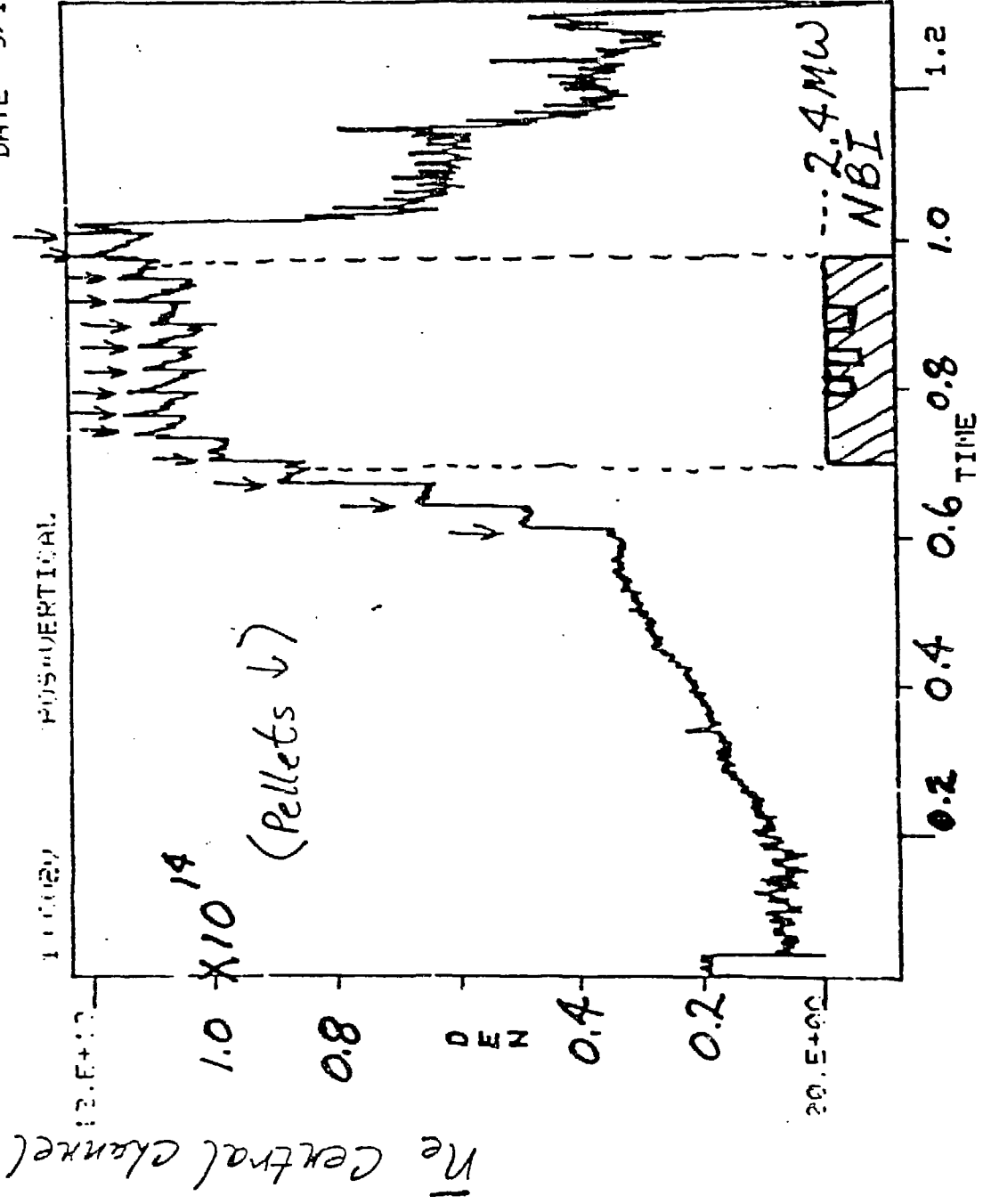
Pellet Size	1.3 mm	(1 Torr-Liter per pellet)
Pellet Speed	800 m/s	
Pellet Rate	40 pellets	per second
Pulse Length	5 seconds	

This injector was capable of producing and maintaining a high density neutral beam-heated plasma without auxiliary gas fueling.

SNC-42307

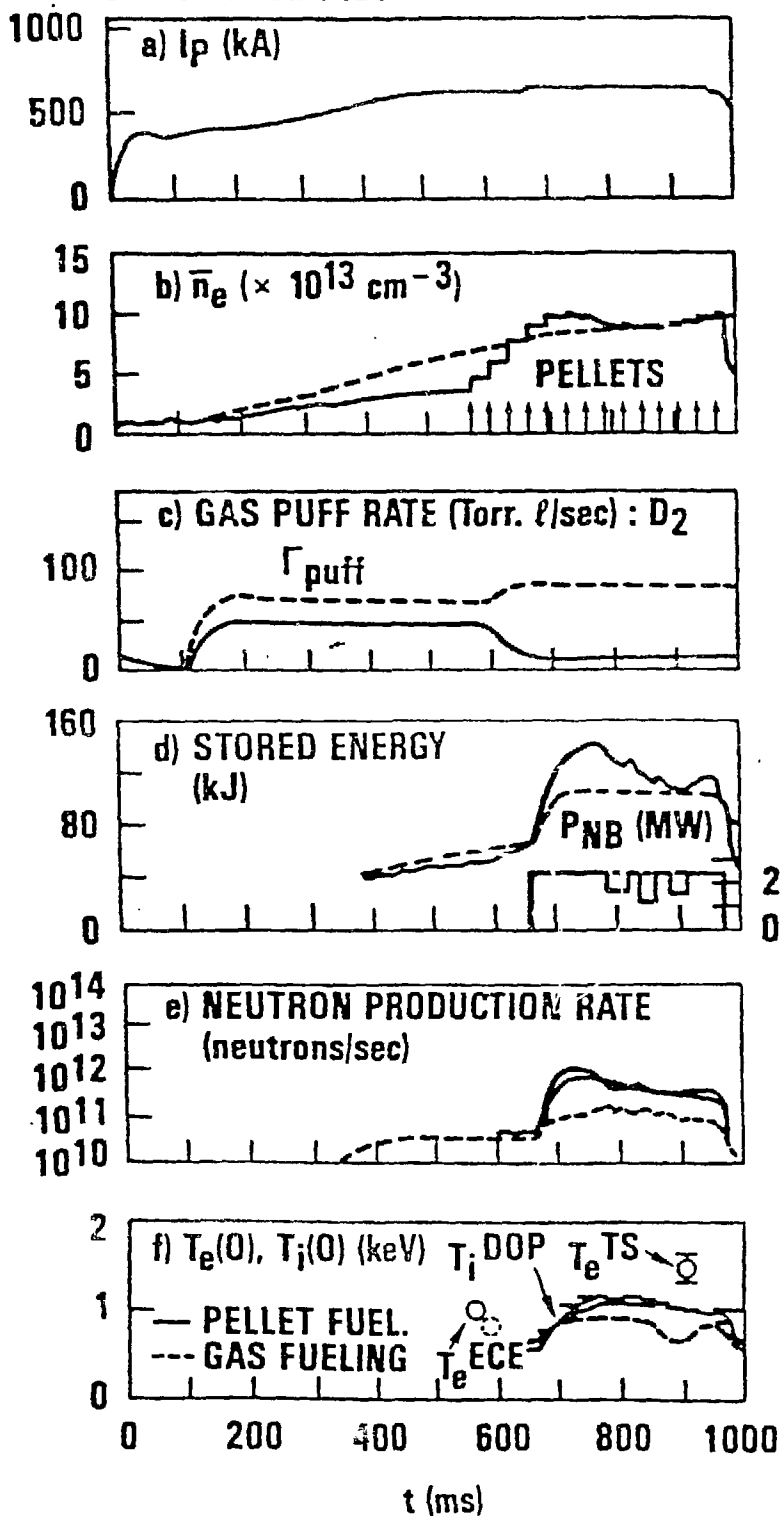
CO2 DENSITY

TIME 13:57:59  
DATE 5/11/1984

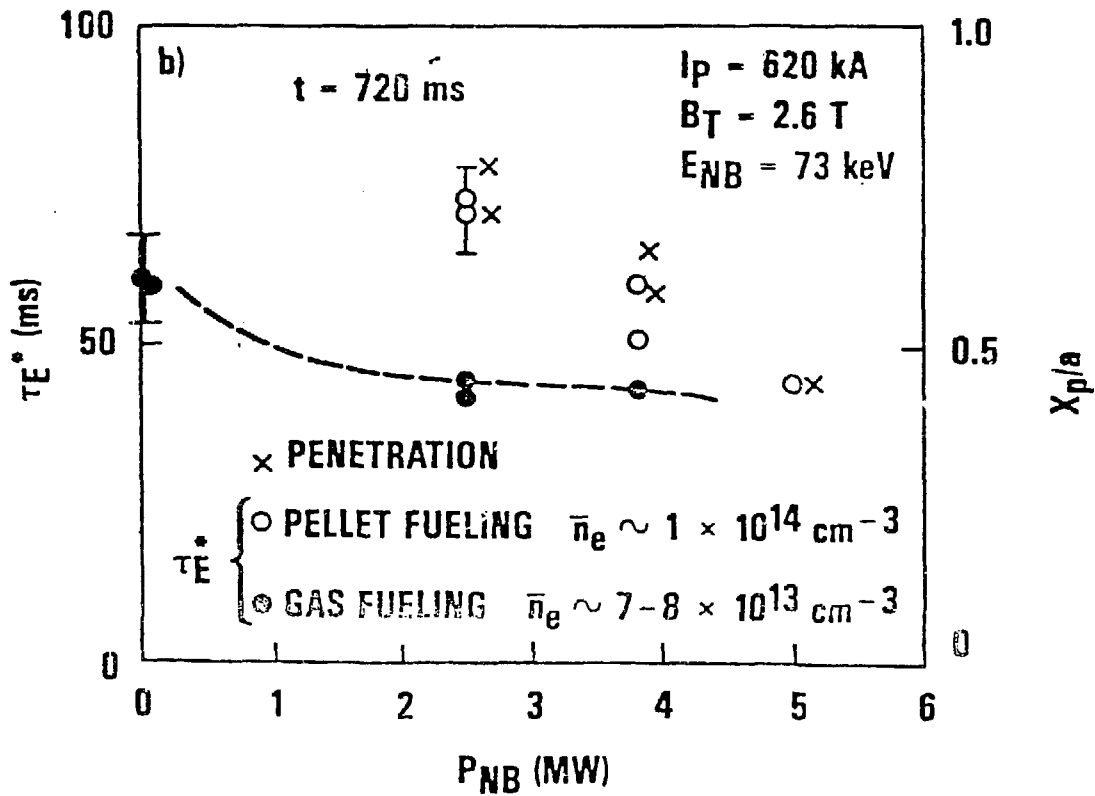
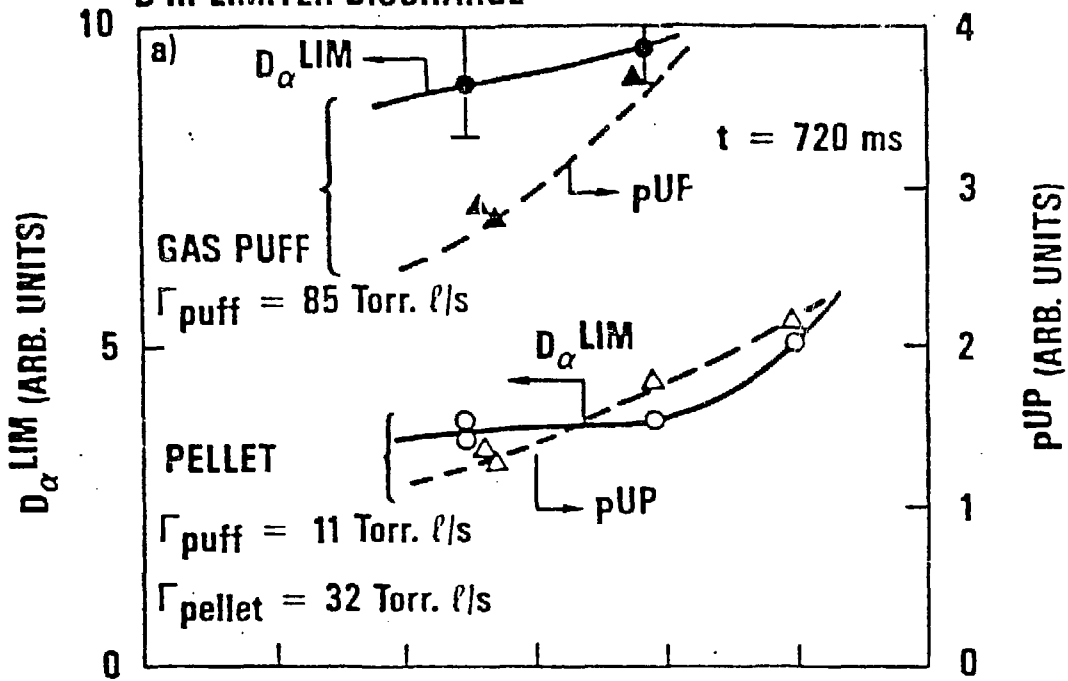


Fairbanks

D-III LIMITER DISCHARGE



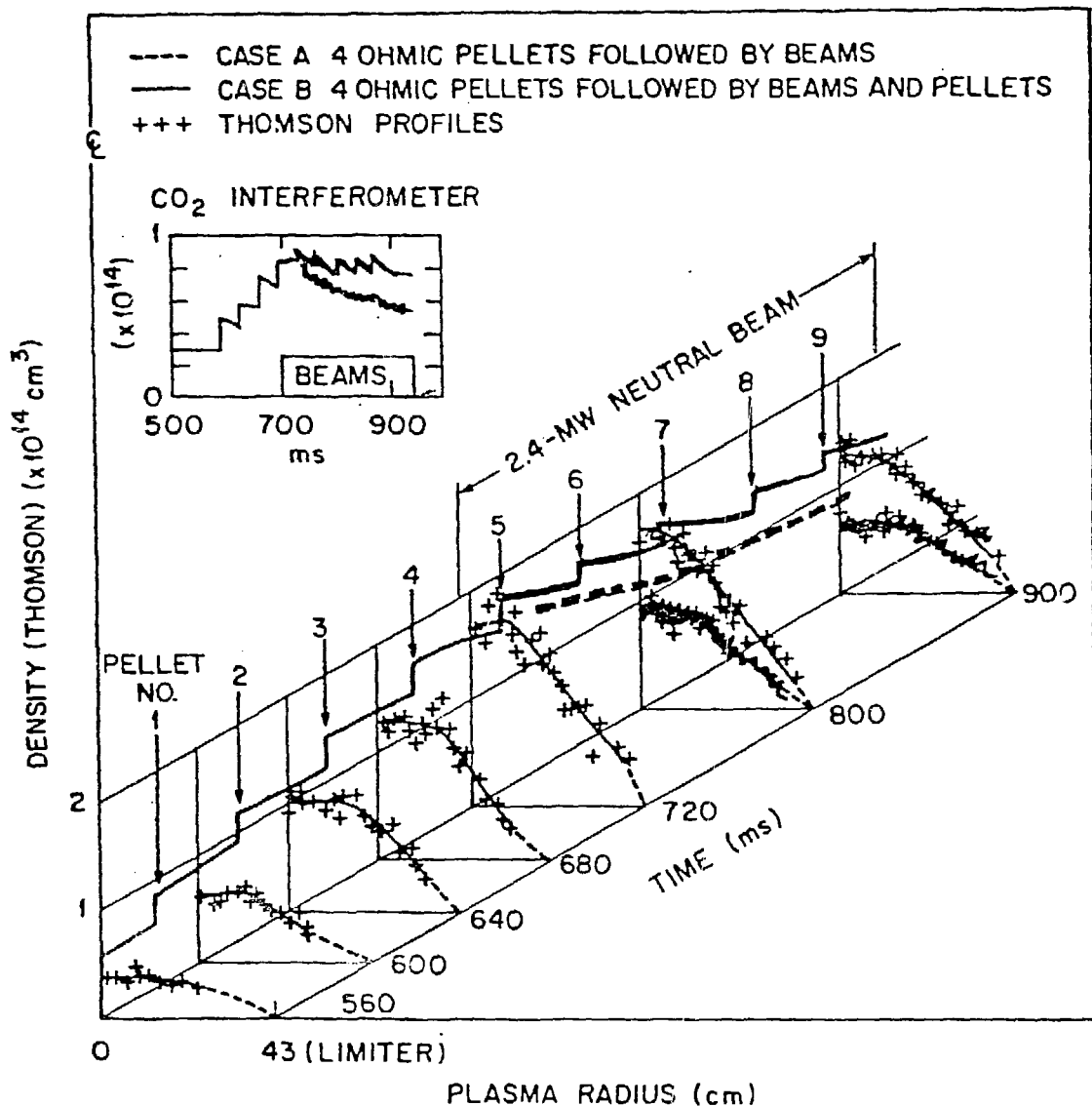
D-III LIMITER DISCHARGE



- Neutral Beam Injection without pellets
- NBI with pellets

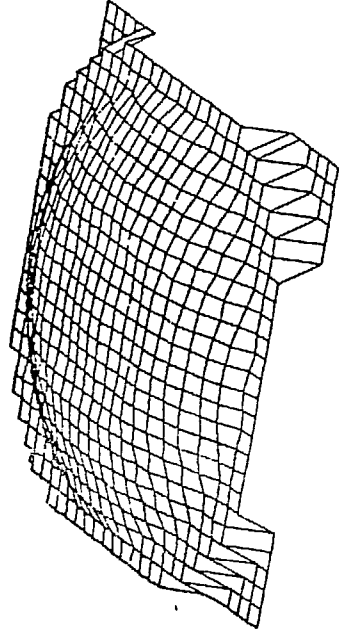
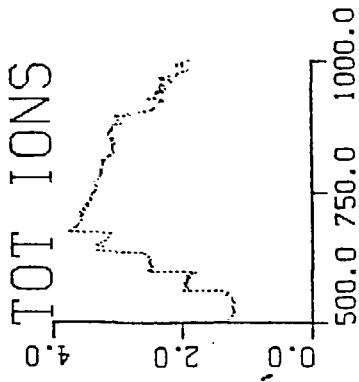
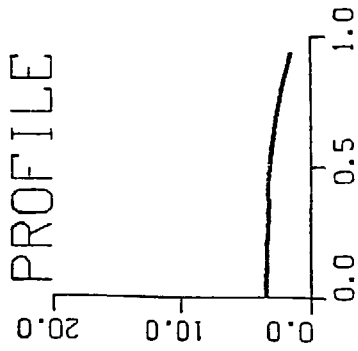
COMPARISON OF THOMSON PROFILES vs 2 X CO<sub>2</sub> INTERFEROMETER

ORNL-DWG 84-3355 FED



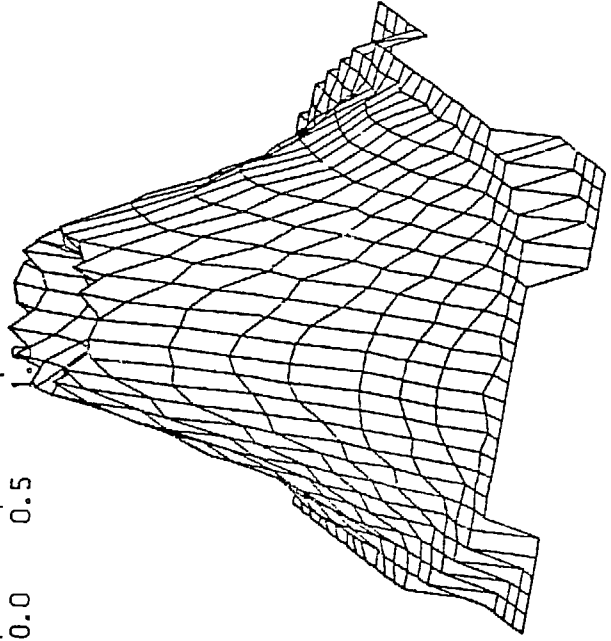
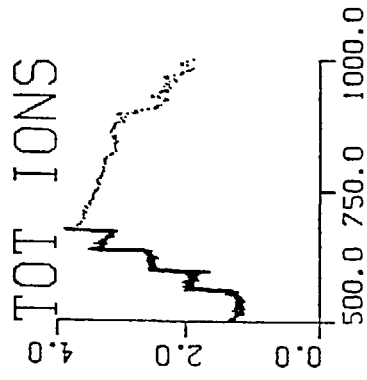
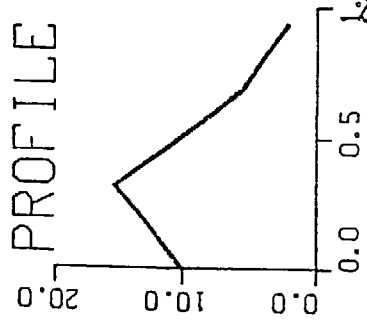
Smith

Z48865.D

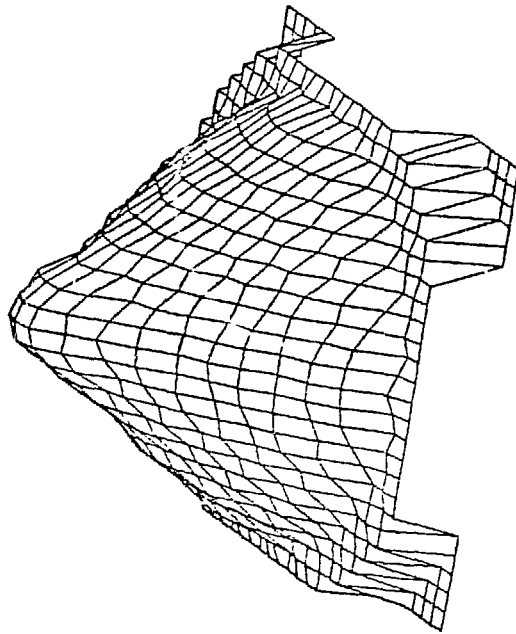
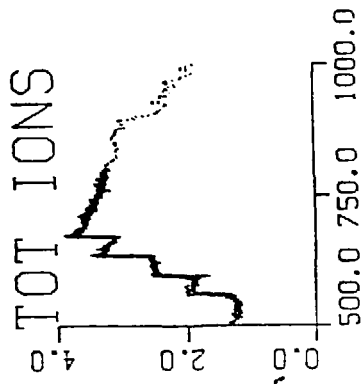
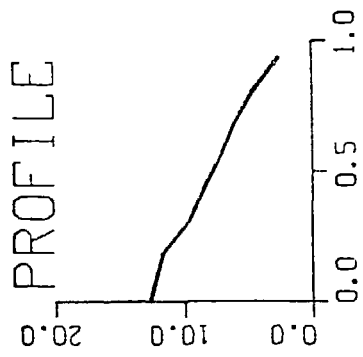




Z48865.D



Z48865.D



Continuous pellet fueling produced superior plasmas in D-III. In limiter discharges plasmas were produced which were significantly different from the traditional gas fueled plasmas.

- Peaked density profiles  
 $n_{e0} / n_e \approx 2$
- Superior energy confinement  
 $\tau_e^* = 70 \text{ ms vs. } 40 \text{ ms gas fueled}$
- Dramatically enhanced fusion reaction rate  
3 - 10 times that of gas fueled

This type of discharge is called the P-Mode since  $\tau_e^*$  is similar to H-Mode divertor plasmas.