Teaser

STATUS AND FUTURE DEVELOPMENTS OF THE PHOENIX ECR CHARGE BREEDER

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Physics cases and Instrumentation for EURISOL-DF,
the next step towards EURISOL

RIB CHARGE BREEDING

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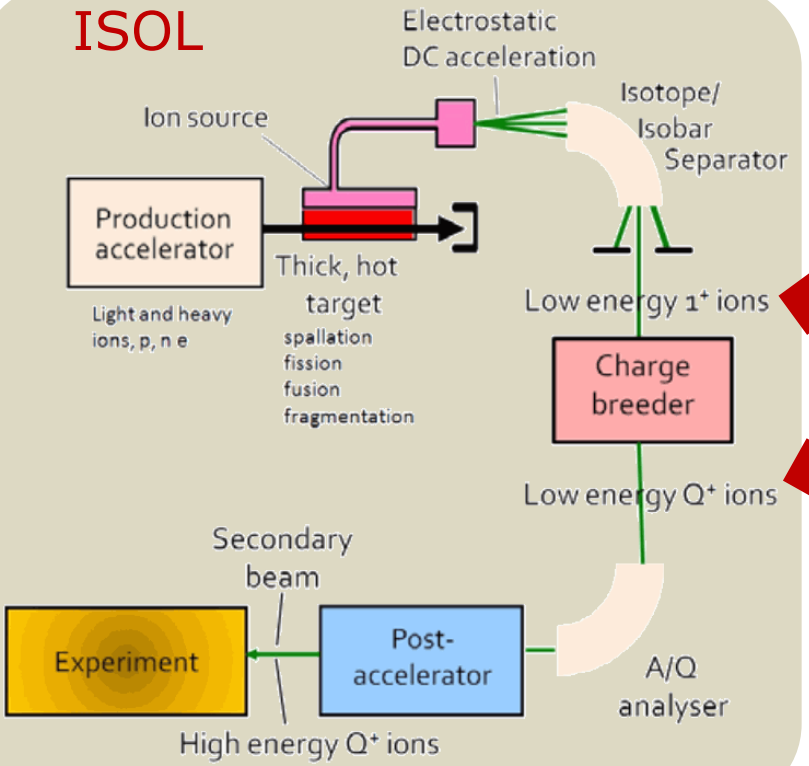
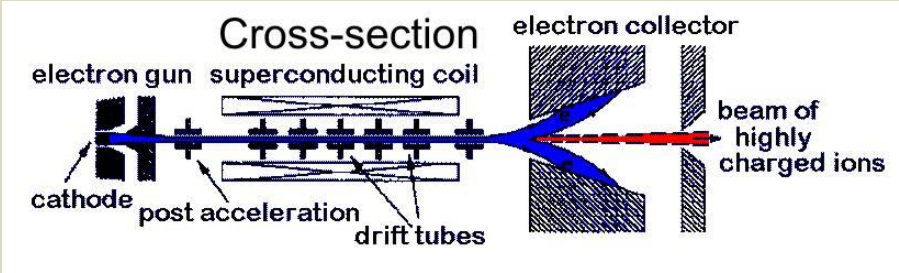
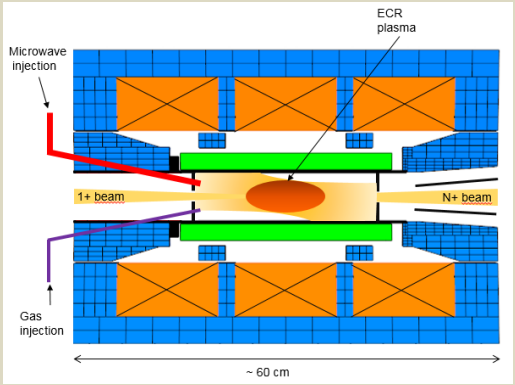
ISOL



Electron Beam Ion Source



Electron Cyclotron Resonance Ion Source



EBIS AND ECRIS COMPARISON

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2005-2009 EURISOL DS : EXPERIMENTS AT CERN-ISOLDE

- EBIS and ECRIS both have advantages and inconvenients
- They are complementary

	ECRIS	EBIS
PROS	-CW OPERATION -ACCEPTS LARGE INTENSITIES (~10^{12} pps)	-LOW N+ BEAM CONTAMINATION -VERY HIGH CHARGE STATE
CONS	- HIGH N+ BEAM CONTAMINATION -CHARGE STATE LIMITED TO A/Q~3-7 DEPENDING ON A	-PULSED OPERATION -LOW INTENSITY ACCEPTANCE (~10^{9} pps)

Recently TRIUMF and ANL stopped ECRIS charge breeding to switch to EBIS

- The downstream N+ beam purification was not high enough and large amounts of contaminants were accelerated

MOTIVATION

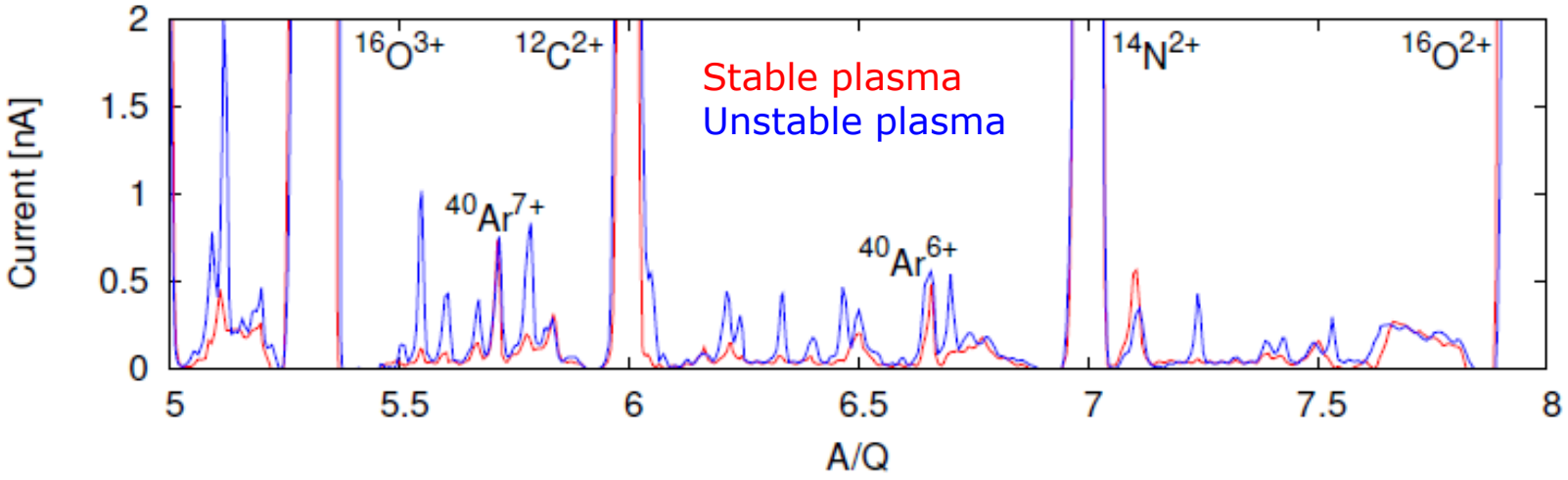
- ECR charge breeding invented at LPSC 20 years ago
  - No special R&D effort was done on the source to reduce the technique drawbacks
- The team is now committed to optimize the ECR CB method
- Can ECR charge breeders cons be mitigated?
  - We believe that YES
- Substantial improvements can be made on ECR charge breeders
  - 1+N+ efficiency can be enhanced
  - N+ High charge state beam production can be improved
  - N+ co-extracted background can be divided by a factor 50 to 100

RECENT RESULTS AT LPSC

Collaboration with JYFL and IAP RAS to assess present beam contamination

- A large part of the beam contaminants are metallic atoms sputtered from the plasma chamber wall
  - Stainless steel and aluminum alloy chemical composition can be derived from the spectrums: Mo, Fe, Cr, Ni, Al, Mn, Zn…

- Plasma kinetic instabilities is a major source of beam contamination



RECENT RESULTS AT LPSC

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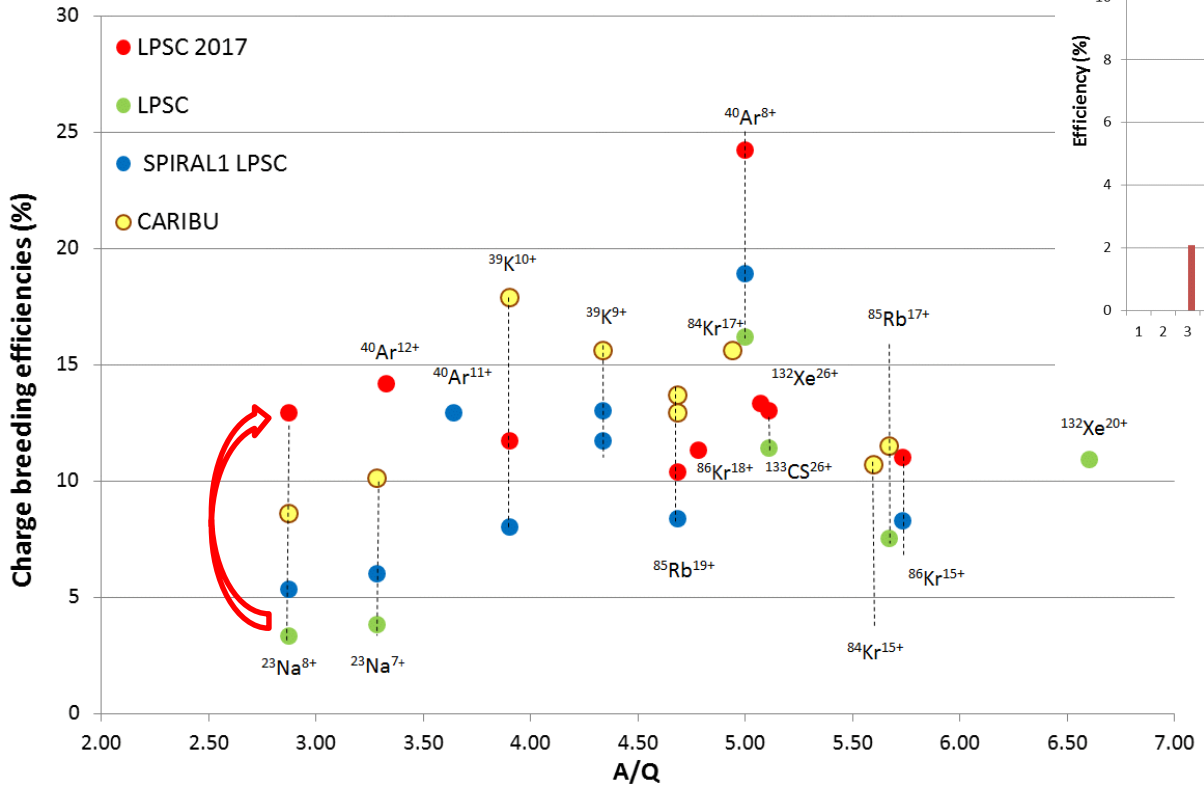
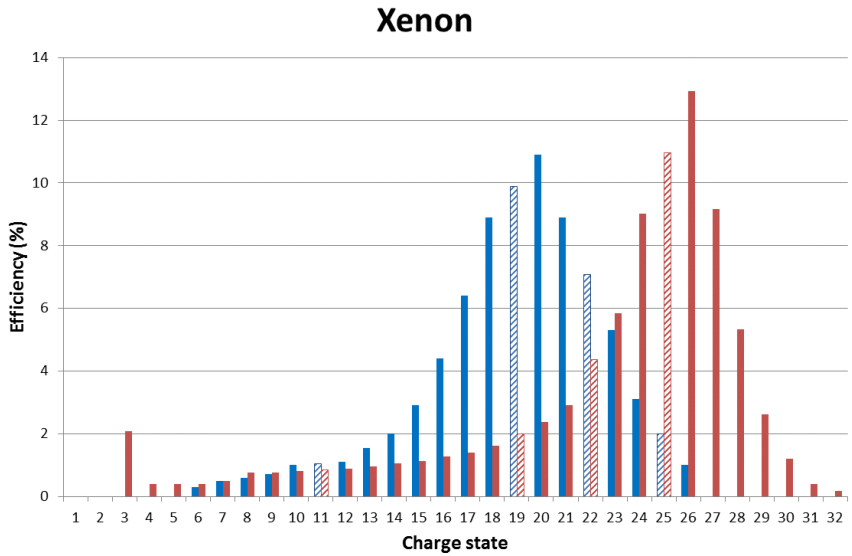
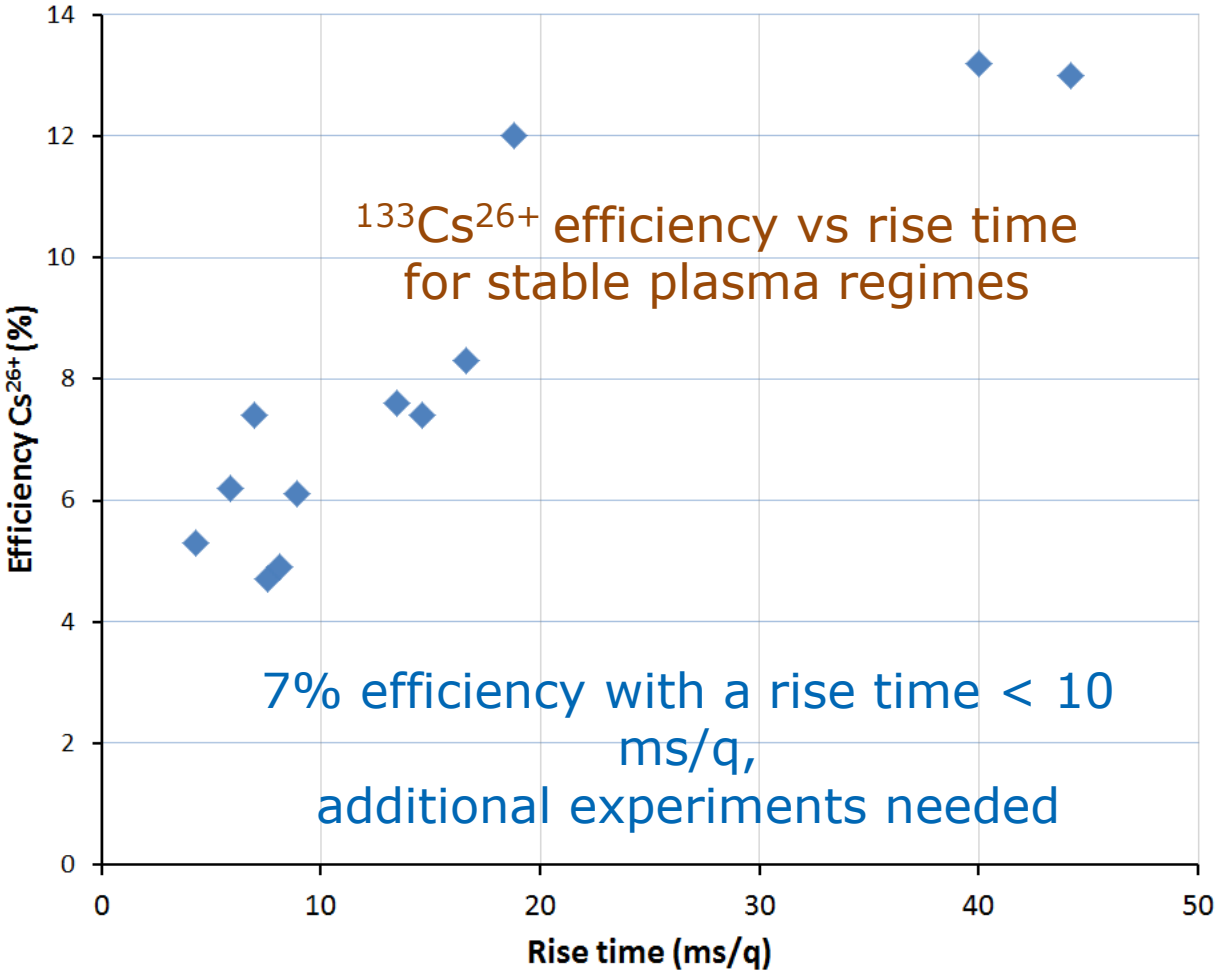
- FIRST UPGRADE (AMONG OTHERS PLANNED IN THE FUTURE) IMPROVED SIGNIFICANTLY THE 1+N+ EFFICIENCIES AND THE ION BEAM CHARGE STATES





RECENT RESULTS AT LPSC



THANK YOU FOR YOUR ATTENTION

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OBRIGADO