SISAK Liquid-Liquid Extraction after Preseparation with the Berkeley Gas-filled Separator

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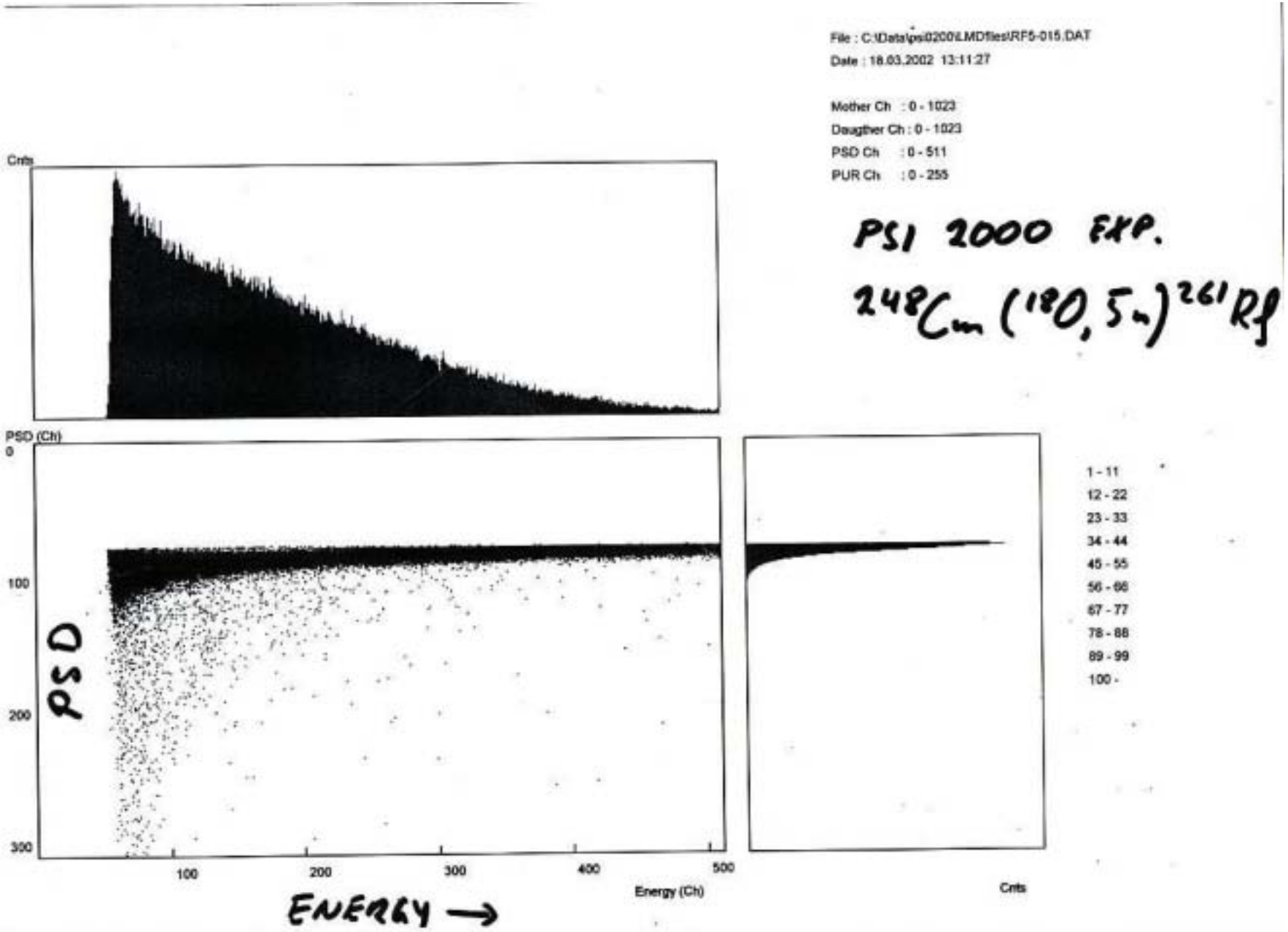
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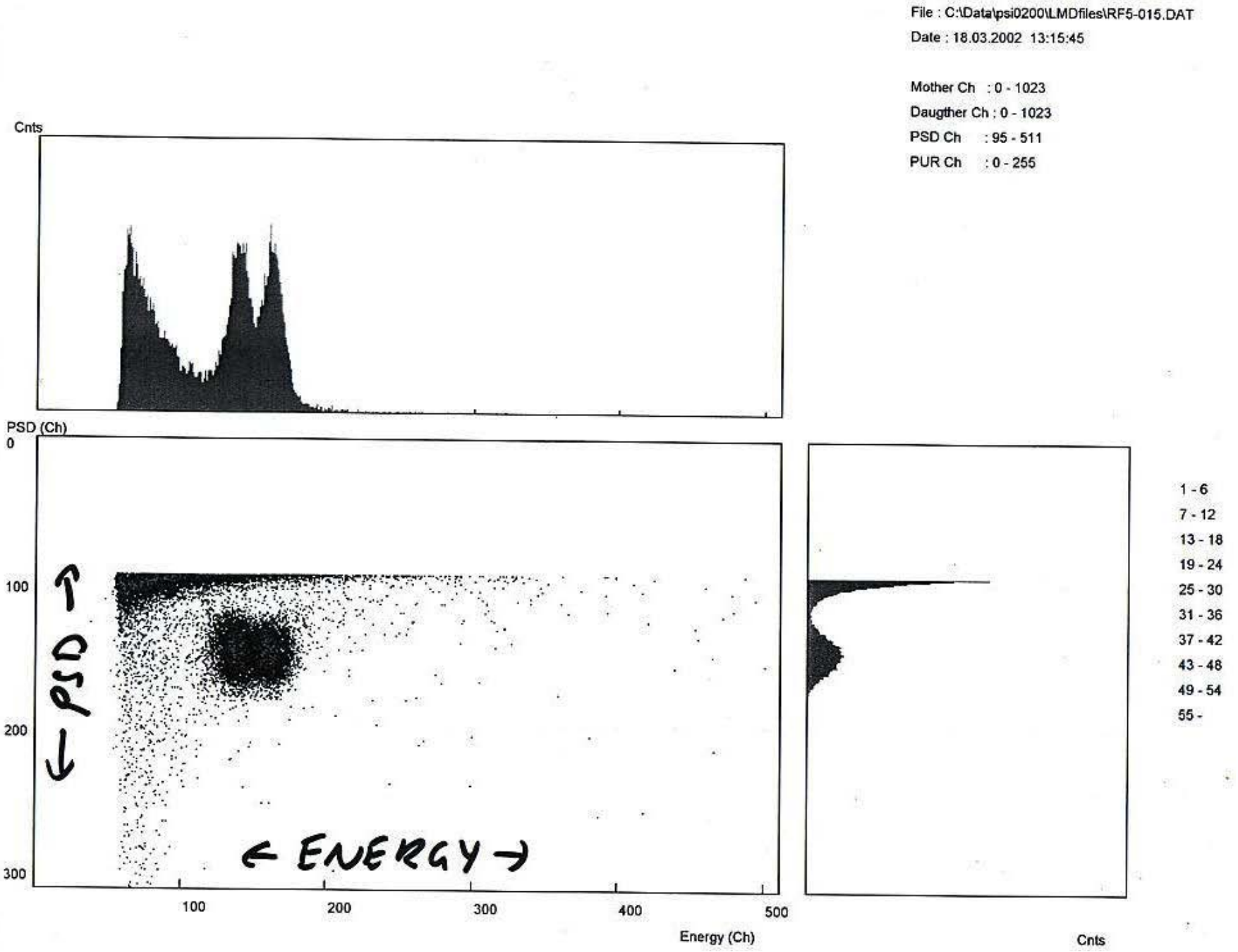
Mother Ch : 0 - 1023
Daugther Ch : 0 - 1023
PSD Ch : 0 - 511
PUR Ch : 0 - 255
PSI 2000 EXP.
248Cm (180, 5n) 261Rf
Cnts
PSD (Ch)
0
100
200
300
PSD
100
200
300
400
500
Energy (Ch)
ENERGY →
Cnts
1 - 11
12 - 22
23 - 33
34 - 44
45 - 55
56 - 66
67 - 77
78 - 88
89 - 99
100 -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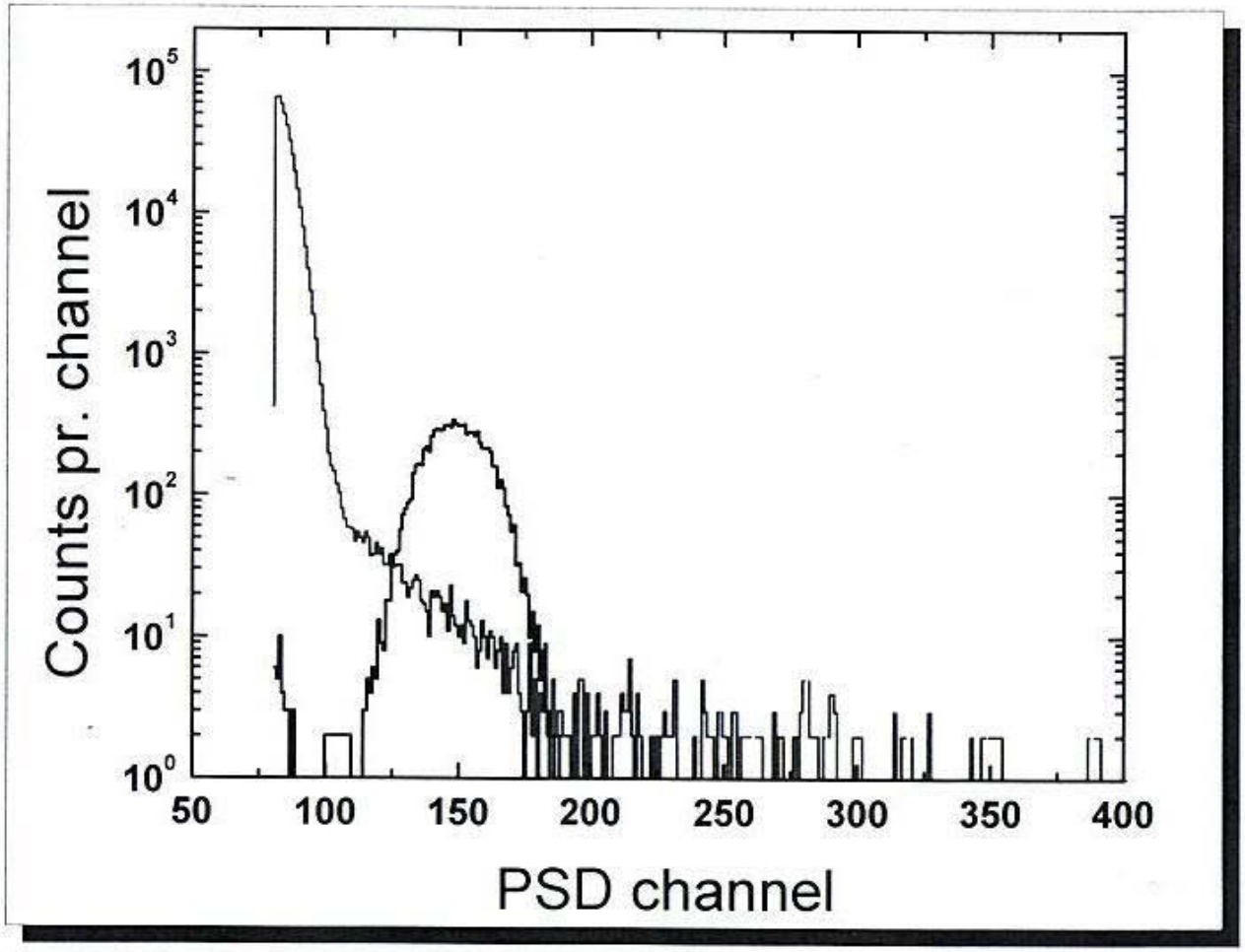
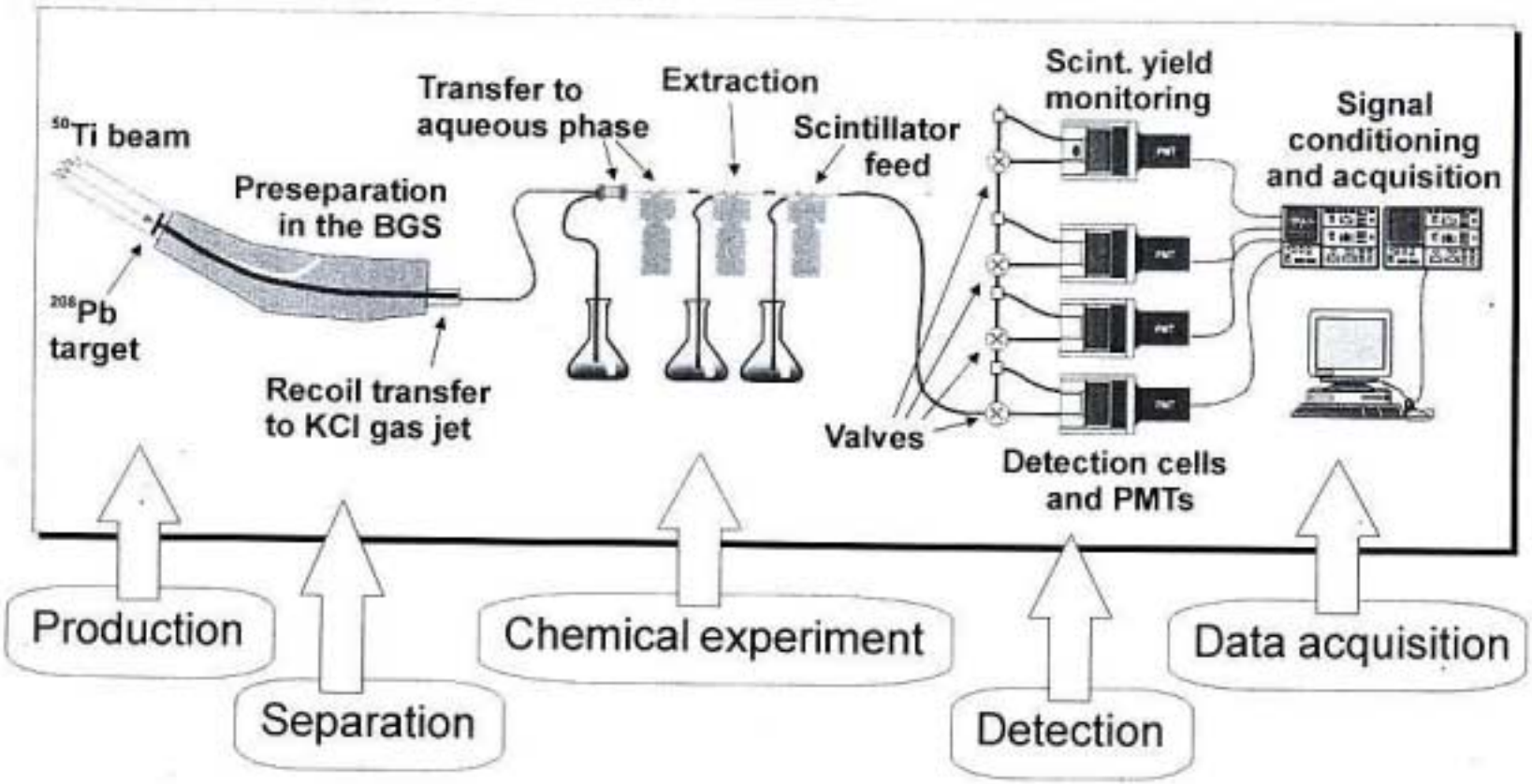
Date : 18.03.2002 13:15:45
Mother Ch : 0 - 1023
Daugther Ch : 0 - 1023
PSD Ch : 95 - 511
PUR Ch : 0 - 255
Cnts
PSD (Ch)
0
100
200
300
↓ PSD →
← ENERGY →
100
200
300
400
500
Energy (Ch)
Cnts
1 - 6
7 - 12
13 - 18
19 - 24
25 - 30
31 - 36
37 - 42
43 - 48
49 - 54
55 -

PSI 2000 Results

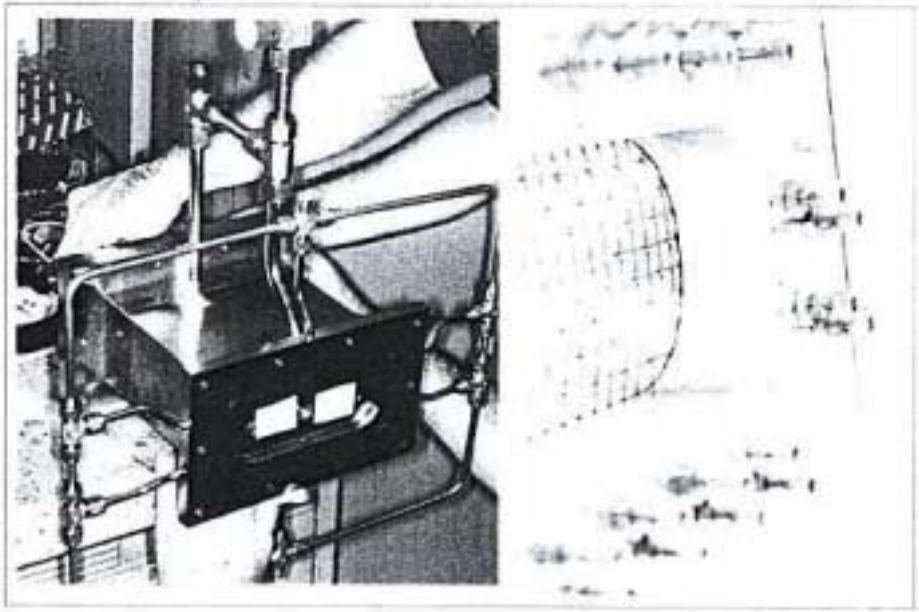


Overview


^{50}Ti beam
^{208}Pb target
Preseparation in the BGS
Recoil transfer to KCl gas jet
Transfer to aqueous phase
Extraction
Scintillator feed
Valves
Scint. yield monitoring
Detection cells and PMTs
Signal conditioning and acquisition
Production
Separation
Chemical experiment
Detection
Data acquisition

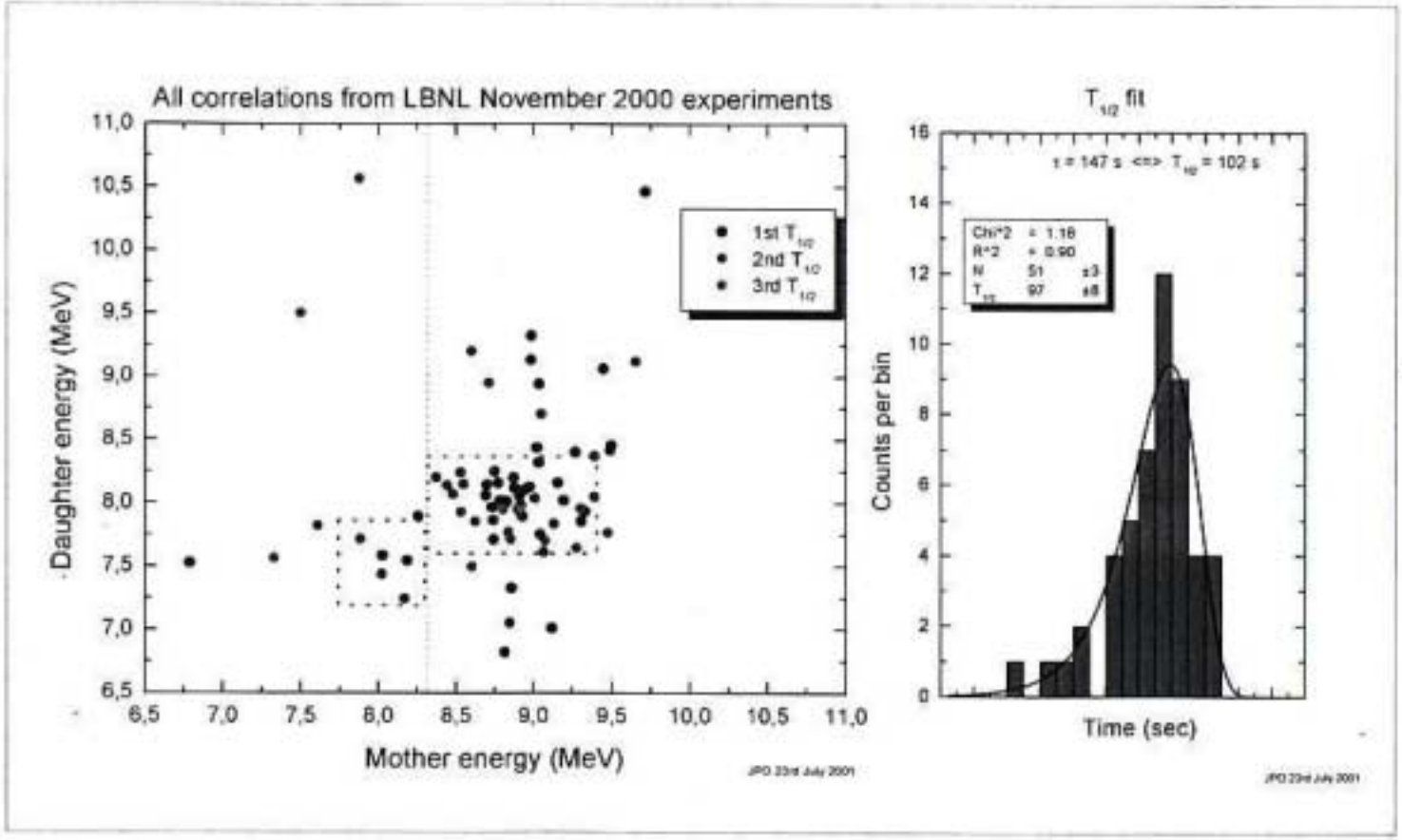
Recoil Transfer Chamber (RTC)

- The RTC transfers recoils (ions) from the separator to the gas-jet.
- The BGS+RTC combination relieves the chemistry apparatus of separating unwanted products.



- BGS pressure ~1 mBar.
- Gas-jet pressure 1.8 Bar (SISAK).
- RTC Window 6 µm (SISAK).
- ~50% efficiency with 20 m capillary.
- Variable chamber depth.

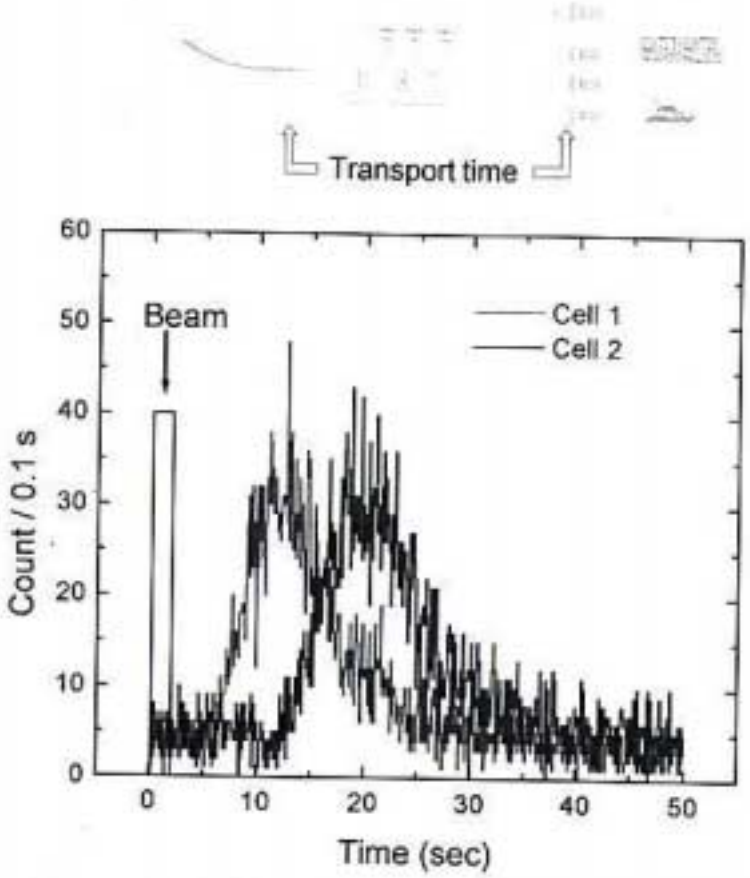
Results from ^{257}Rf experiments



RTC-SISAK yield

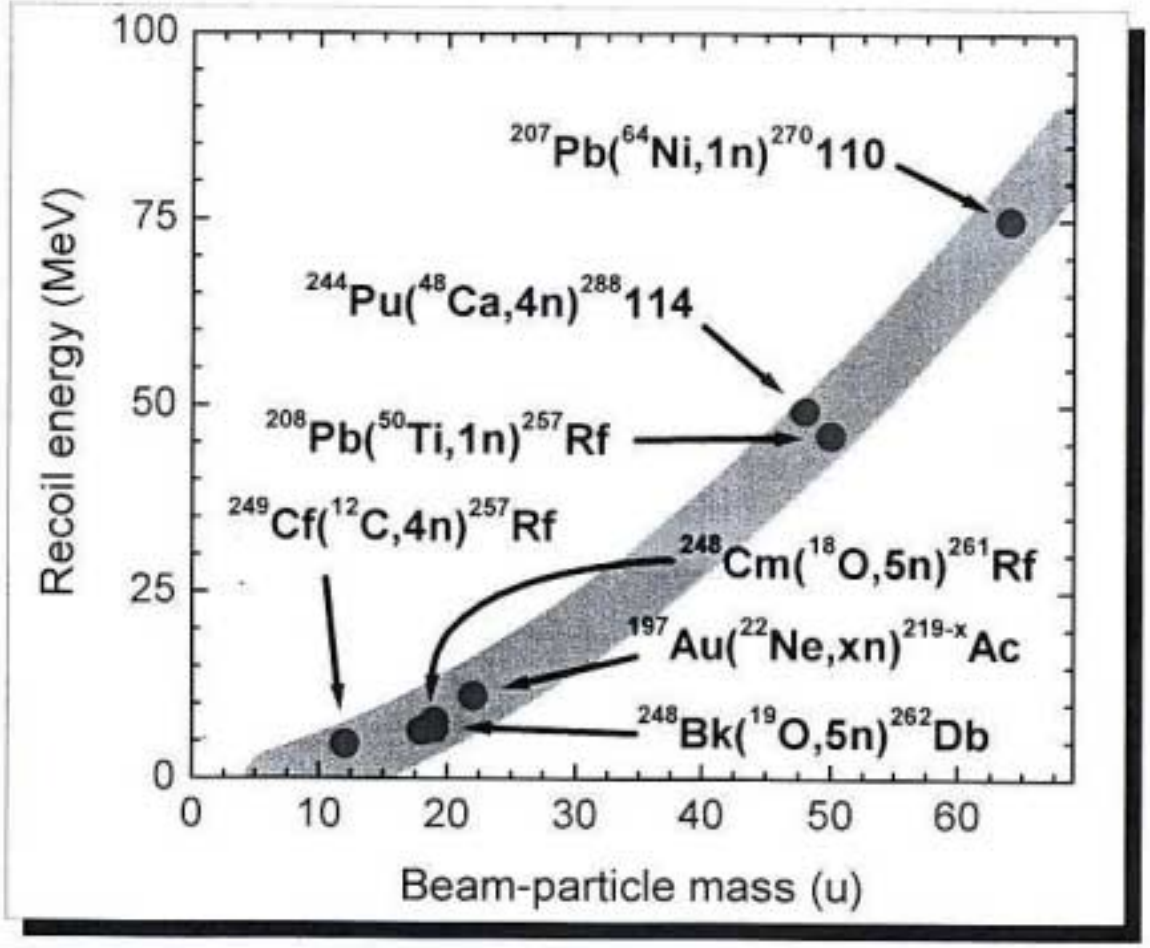
- About 1.7 ^{257}Rf ions entered the SISAK detectors per hour.
  - 37 correlations were observed in 31.3 hours (no chemistry).
  - On basis of branching ratios this correspond to 52 ^{257}Rf ions.
- From measurements with the BGS focal-plane detector it's estimated that ~25 ^{257}Rf entered the RTC per hour.
- From Monte Carlo simulations it is estimated that 74% of the activity will be lost between the RTC and the SISAK detectors due to the transport time.
  - 6.5 ^{257}Rf ions should have reached the detectors if the yield had been 100%
- Total yield, except for half-life losses, is about 25%
  - This includes losses through the RTC window, gas-jet transport losses, and losses occurring when the aerosol particles are transferred to the organic liquid.

TRANSPORT TIME
~~Detector details~~



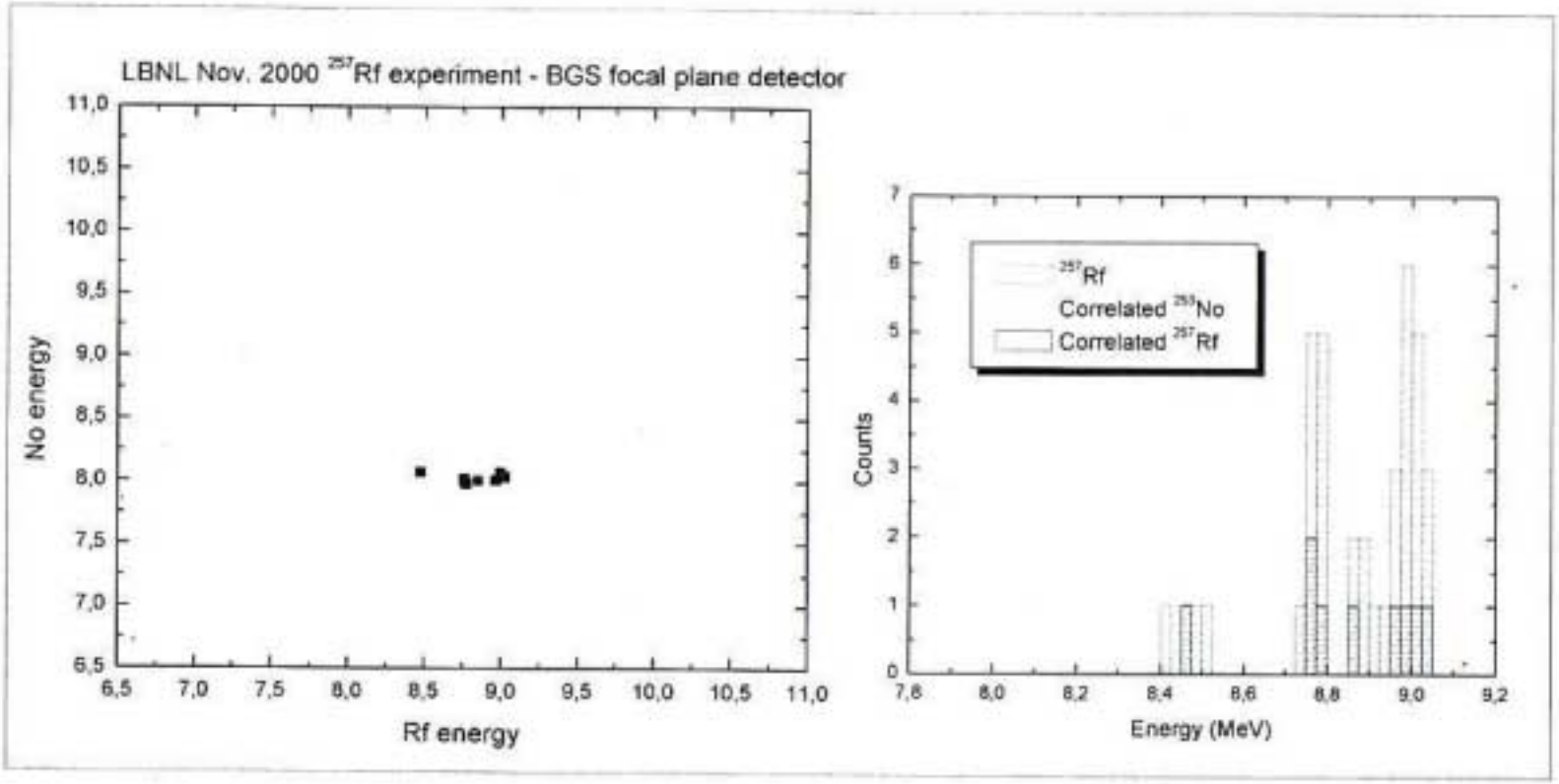
- Break through time: = ~6 s.
- Main part arrives after: ~12 s.
- Time between detectors: ~8 s.
- RTC depth: 7 mm.
- Gas-jet capillary length: 18 m.
- Only the SISAK degasser was used (detector test configuration).

Limits for presepartion



- A certain recoil energy is needed to enter the RTC window.
- Current, practical limit ~30 MeV.
- RTC window-thickness limit is ~2.5 μm mylar.
  - SISAK experiments used 6 μm.

BGS Pre-Separation



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