Envisaged first TASCA configurations

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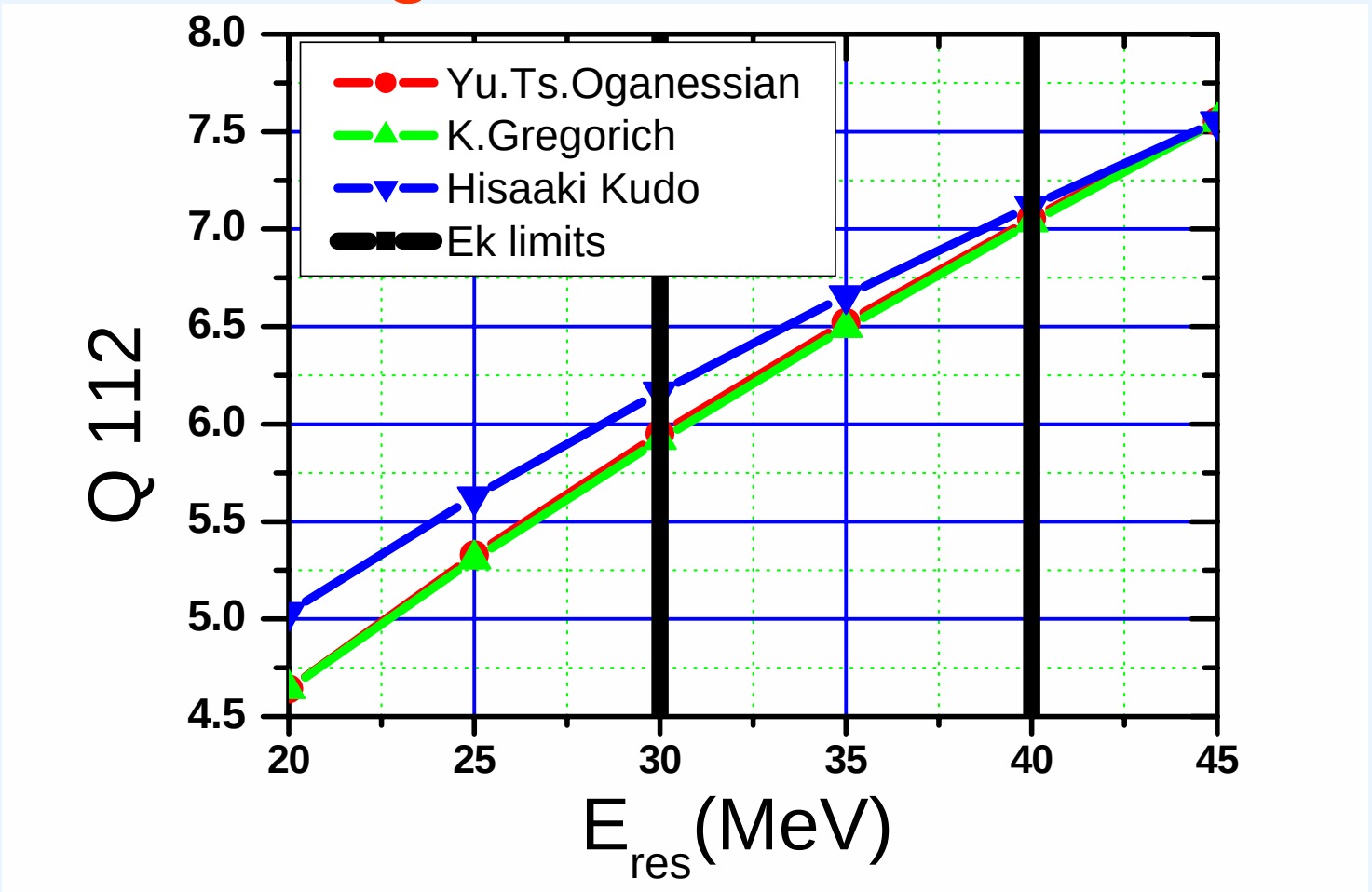
Present Aims

- High efficiency separator for Superheavy elements research
- High transmission
- Relatively high background reduction
- Using existing NASE components
- Price of separator should be low

Topics of Discussion

- Charge states and magnetic rigidity calculations in Helium gas
- TRANSPORT calculations of possible TASCA magnetic schemes

Charge state calculations

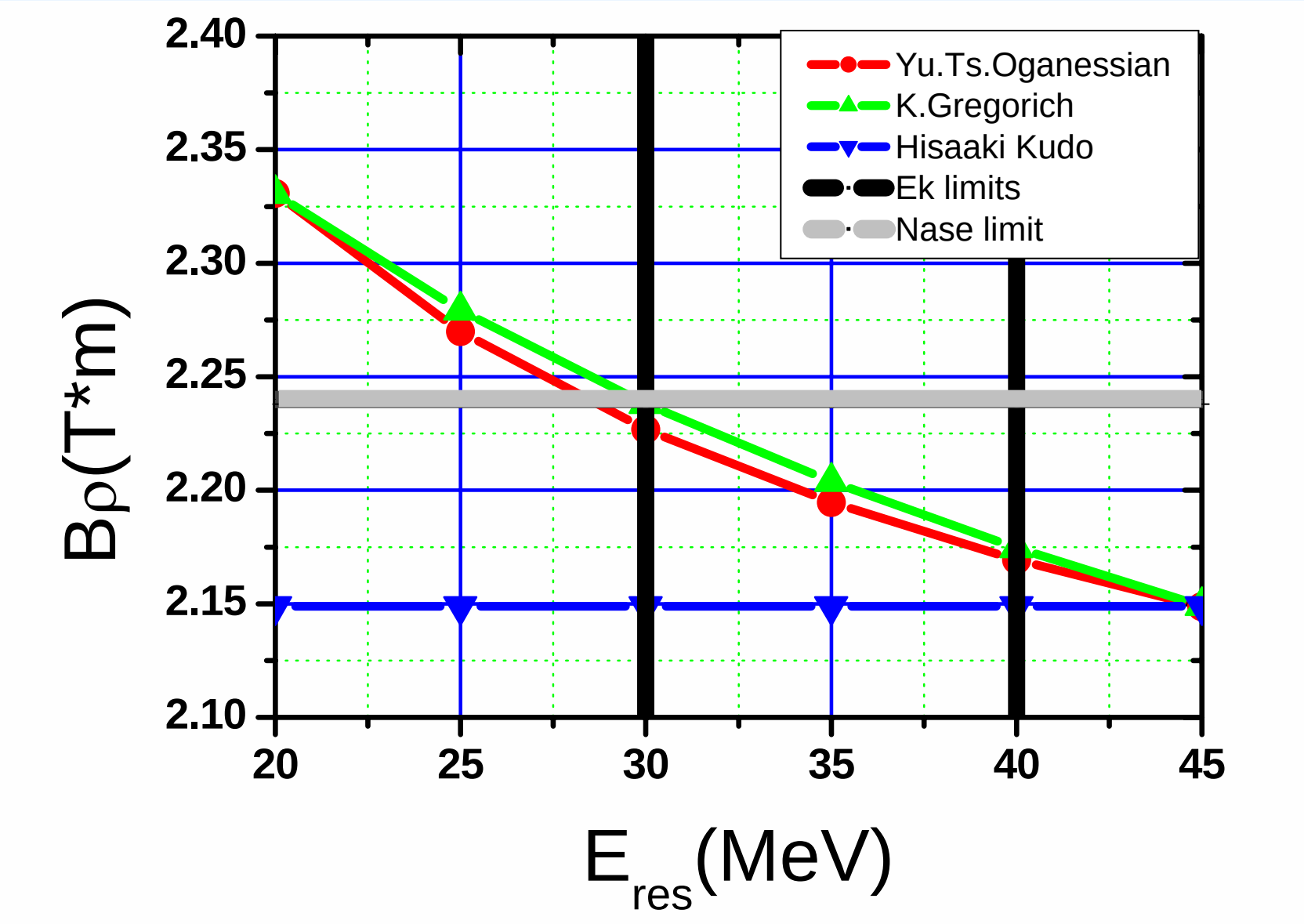


Yu.Ts.Oganessian (1990): $q = (3.3*10^{-7}) * v * Z^{1/3} - 1.18$, $v * Z^{1/3} > 2*10^{7}$

K.Gregorich (2003): $q = 0.52 * (v / v_0)^{1.2} * Z^{1/3}$

H.Kudo (2003): $q = 0.625 * (v / v_0) * Z^{1/3}$, $8 \le (v / v_0) * Z^{1/3} \le 20$, $Z \ge 82$

Magnetic rigidity calculations



Input parameters for TRANSPORT calculations

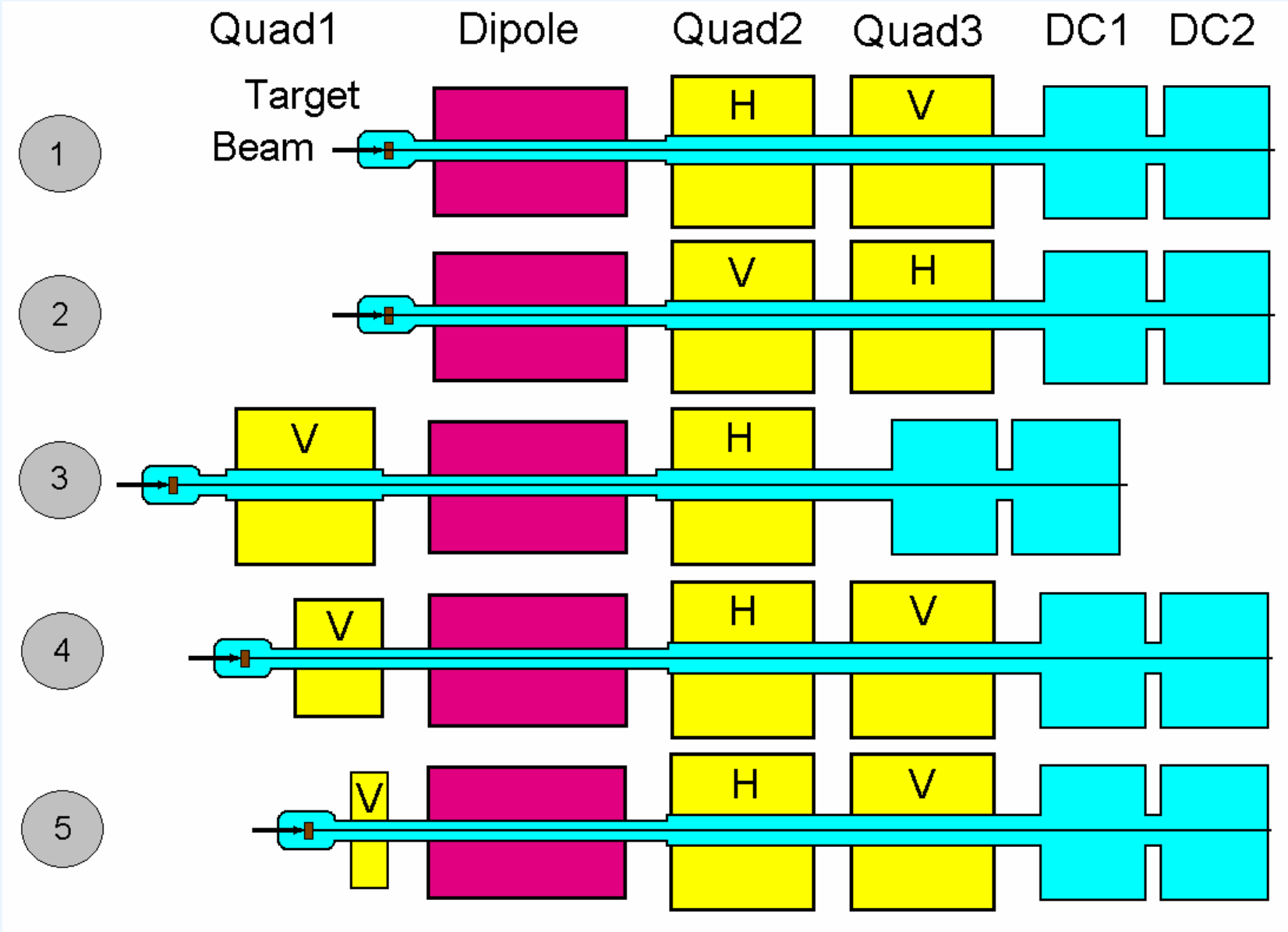
The studied reaction is:

- $^{48}Ca(238.8\ MeV) + {}^{238}U(0.5\ mg/cm^2) \rightarrow {}^{286}112 \rightarrow {}^{283}112 + 3n$
- 54% of $^{283}112$ will appear within ±40 mrad
  (according to simulations of K.E.Gregorich)

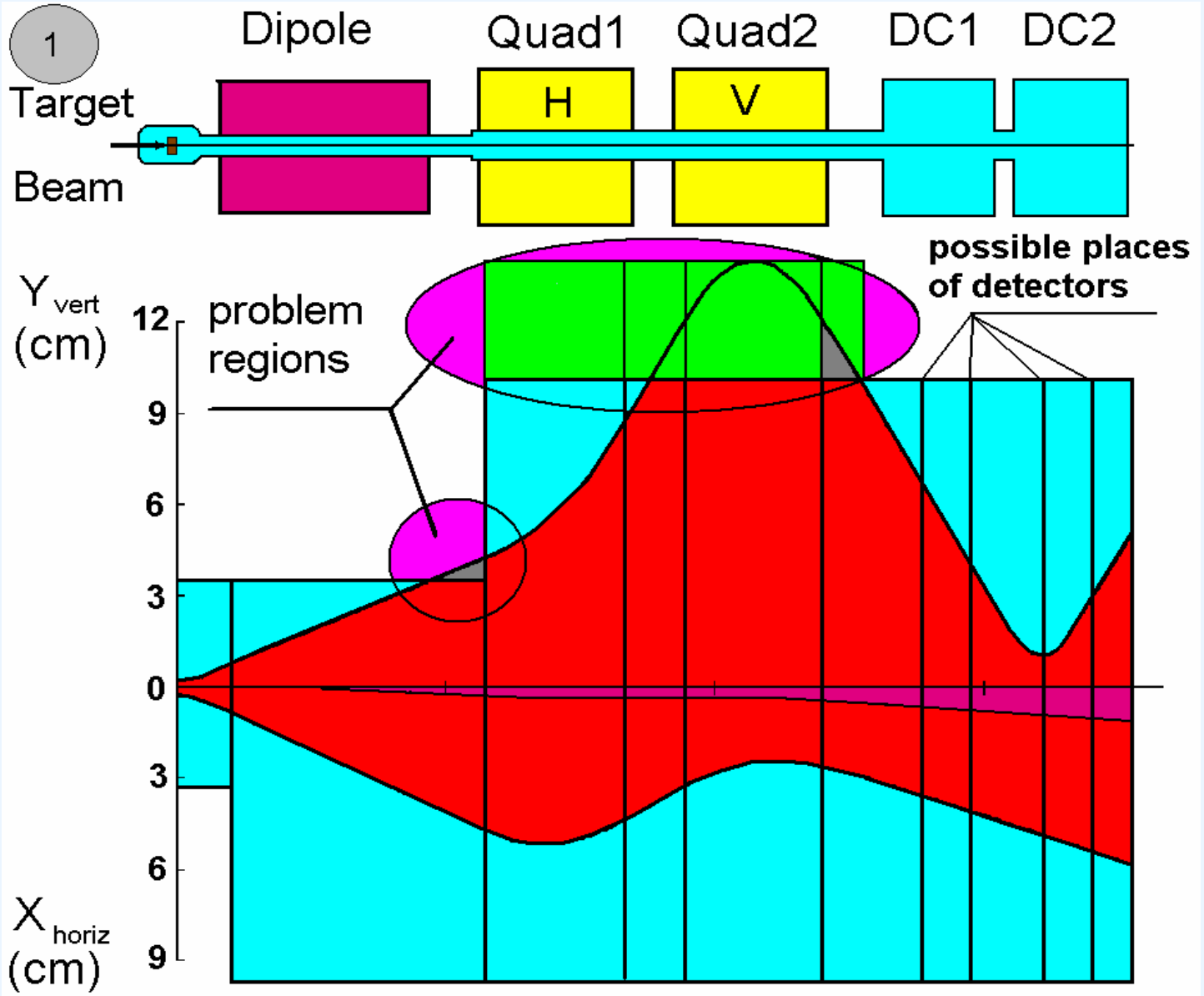
Input parameters:

- Horizontal and vertical beam size - ± 2.5 mm
- Horizontal and vertical inclination of the beam - ± 40 mrad
- Momentum dispersion - ± 5% (92% of all $^{283}112$)
- Magnetic rigidity – 2.24 T*m

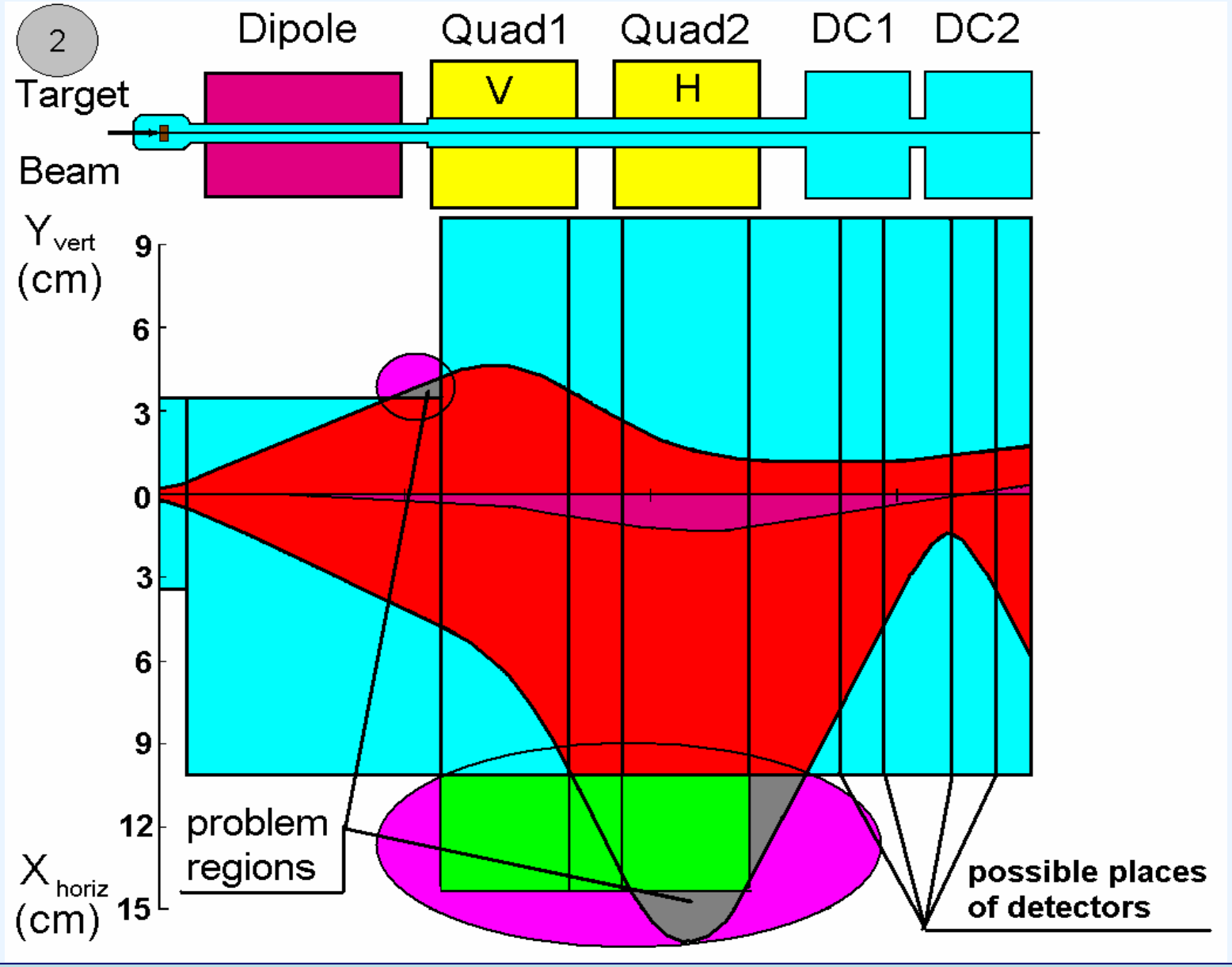
Possible structures of TASCA



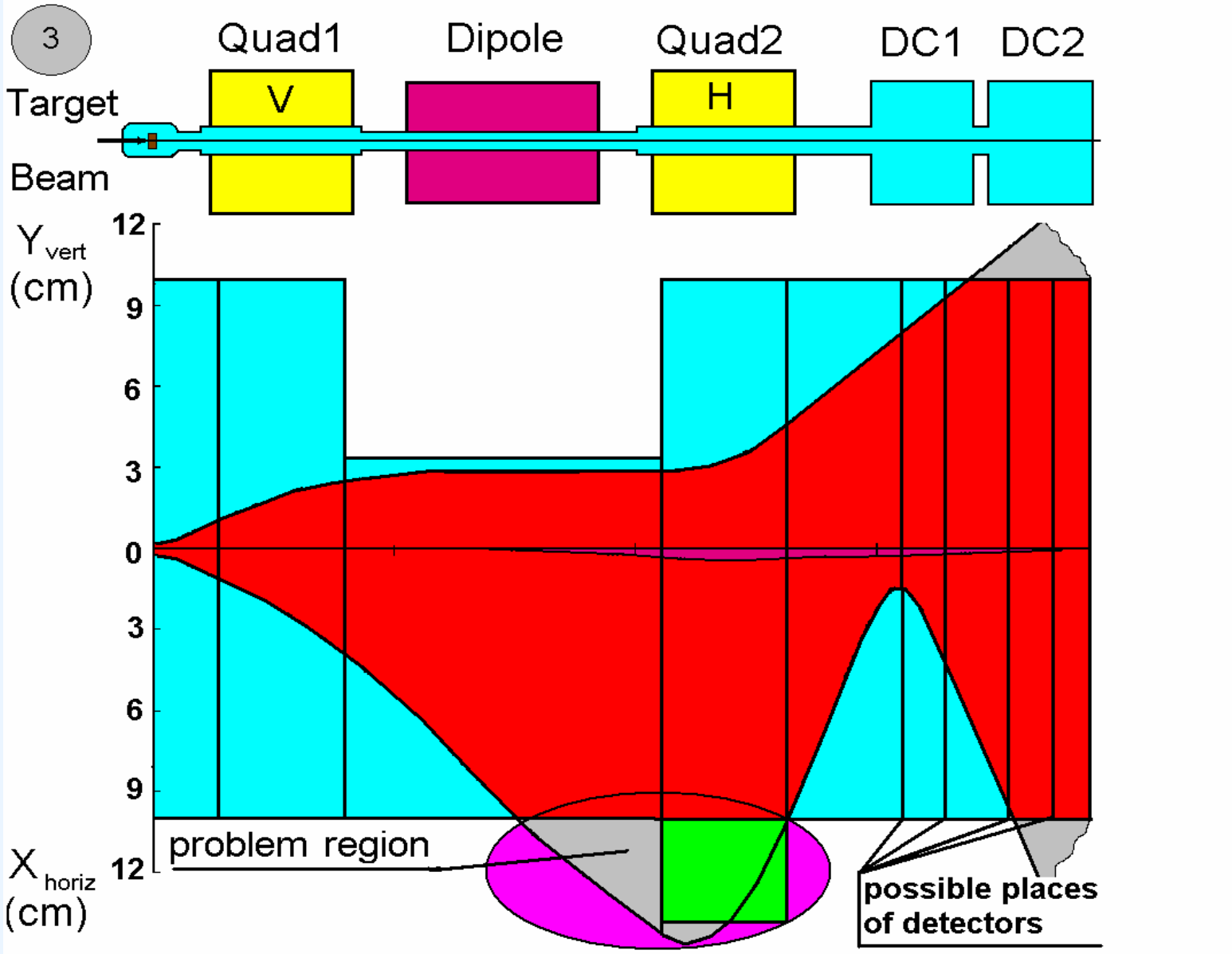
DQ_hQ_v - configuration



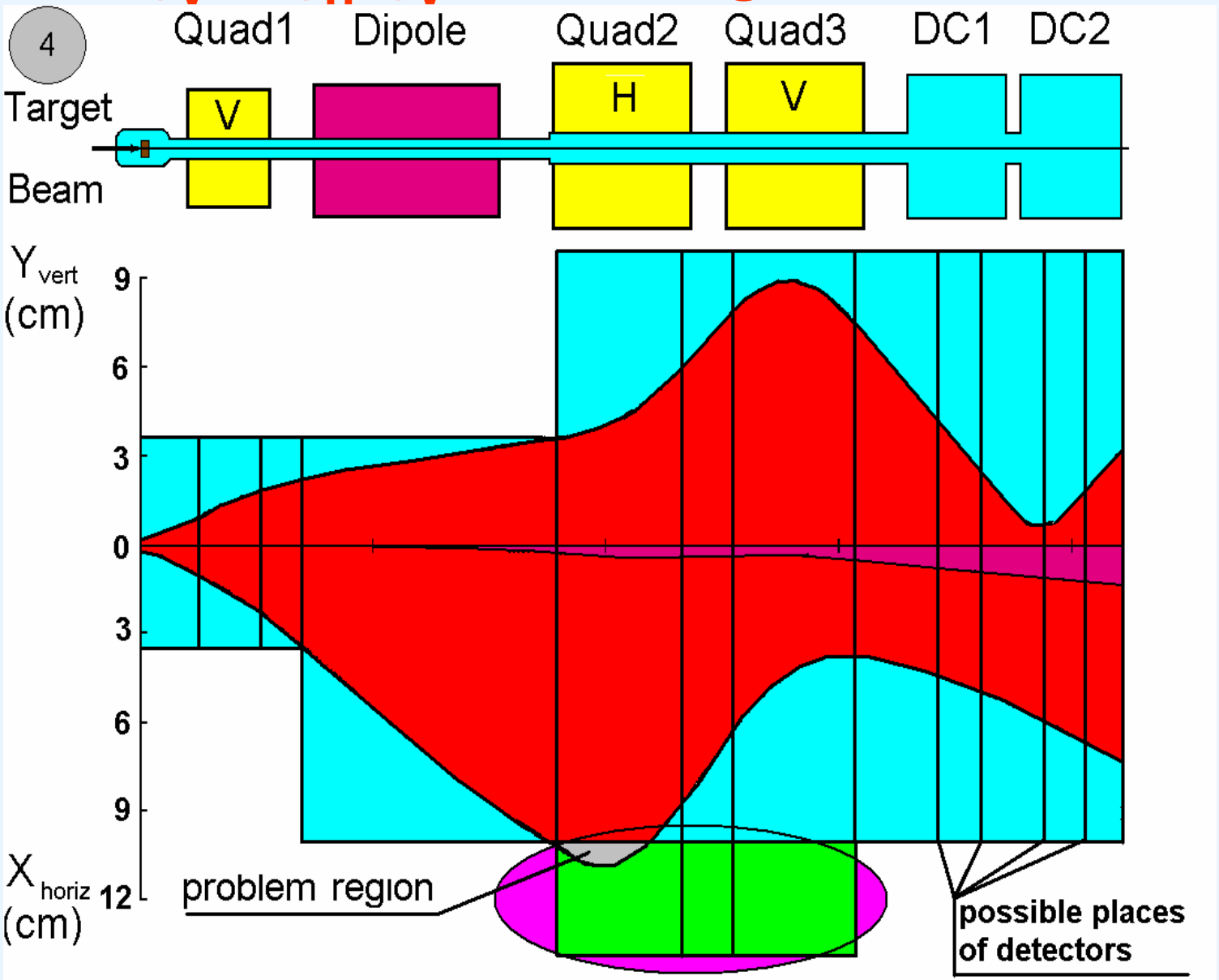
DQ_vQ_h - configuration



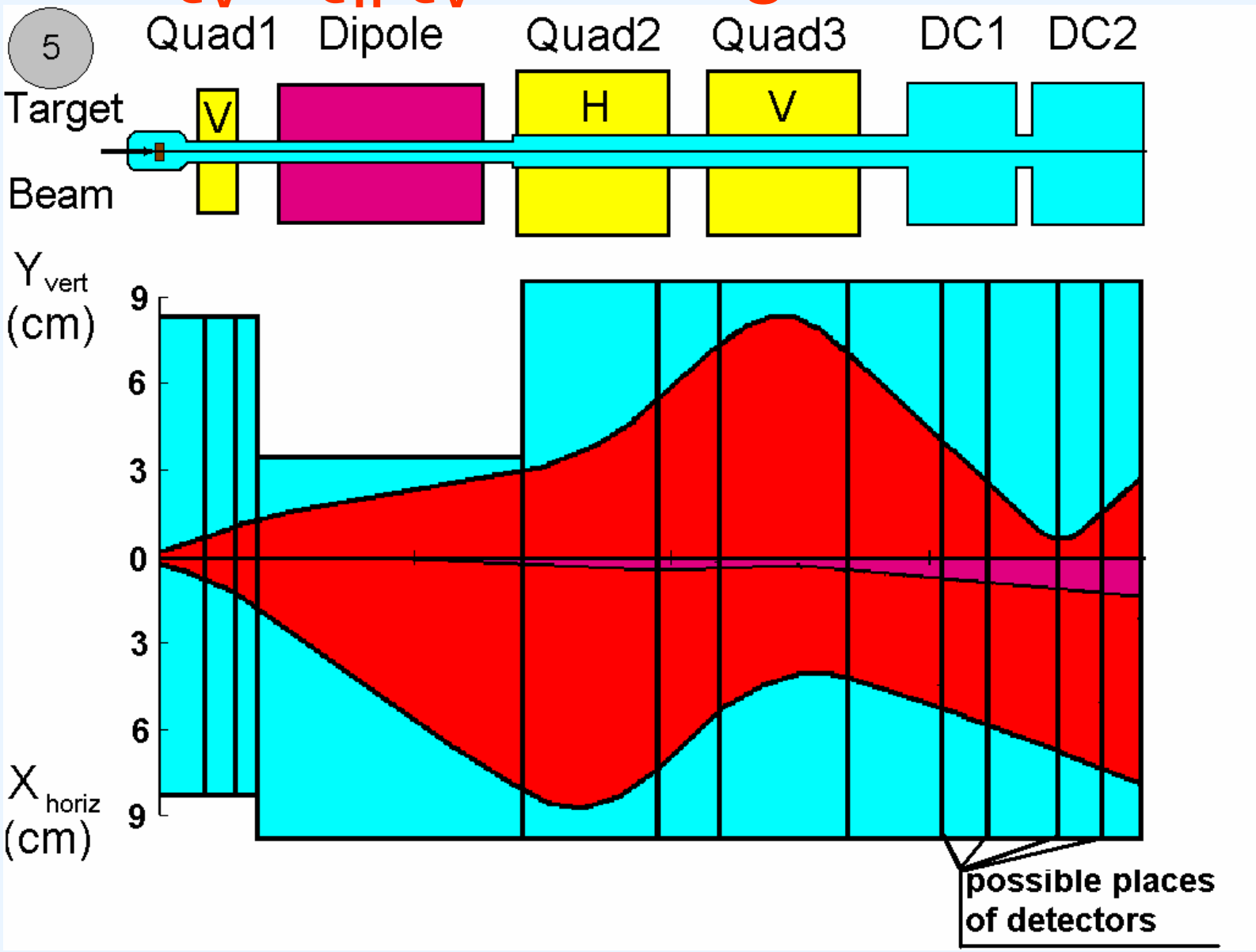
Q_vDQ_h - configuration



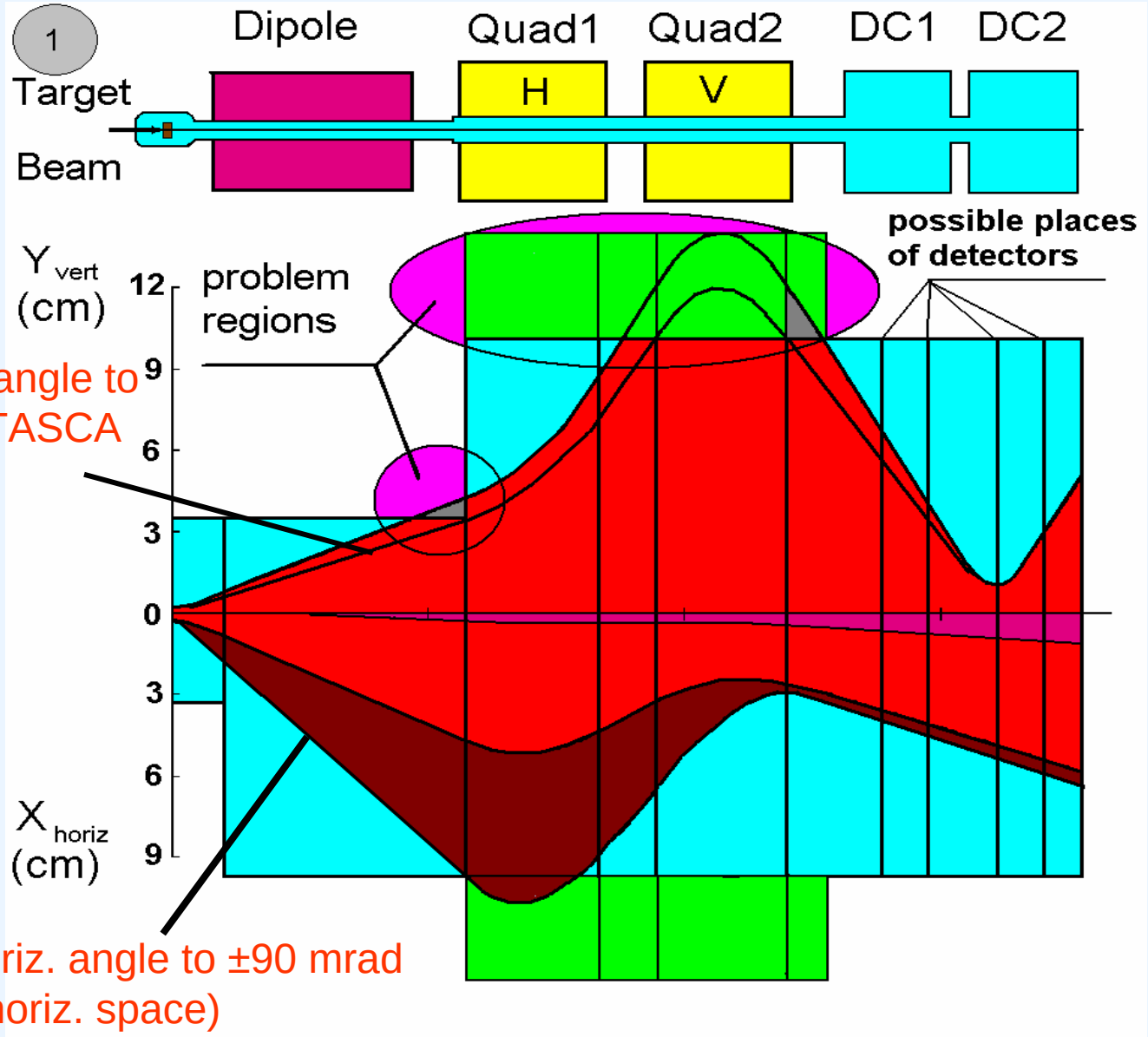
$Q_vDQ_hQ_v$ - configuration



$Q_vDQ_hQ_v$ - configuration



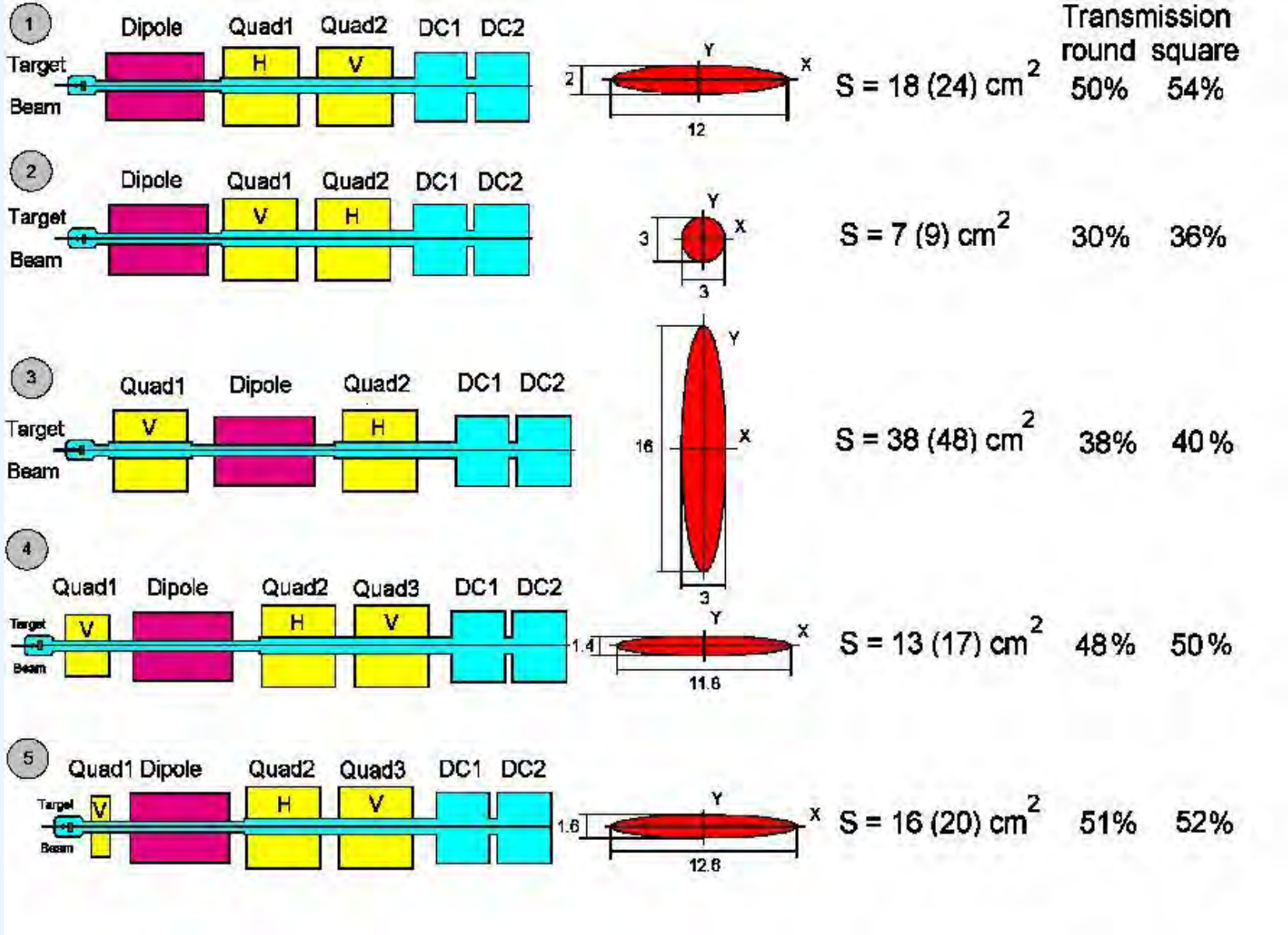
DQ_hQ_v - configuration with new input parameters



reduce vert. angle to ±30 mrad = TASCA acceptance

increase horiz. angle to ±90 mrad (use extra horiz. space)

Summary data at the exit focus



Resume for near future:

The DQ_hQ_v (case 1) - especially with square vacuum chamber for quads - and the $Q_vDQ_hQ_v$ -configuration (case 4) with normal quads is most useful and effective:

- highest transmission
- lowest background
- high dispersion
- most components exists:
  - Quad1, Dipole, Quad2, Quad3
  - Vacuum chambers for all magnetic elements and two detector chambers
  - Power supplies for Quad2 and Quad3

Future plans:

- Monte-Carlo simulations of transmission with higher accuracy
- Next year – constructing TASCA separator based on existing components (DQQ configuration if new calculations agree with the present ones)
- Following two years - testing TASCA separator