Directional exposure vs latitude
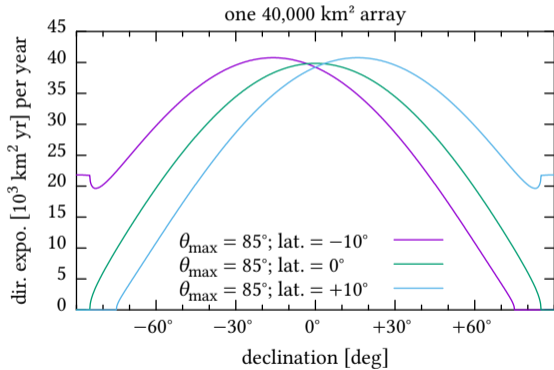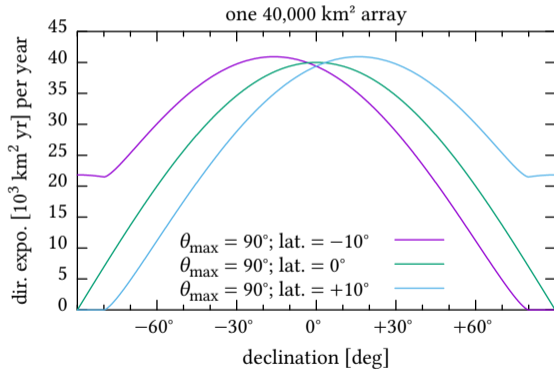
A summary of my talk last year

Armando di Matteo
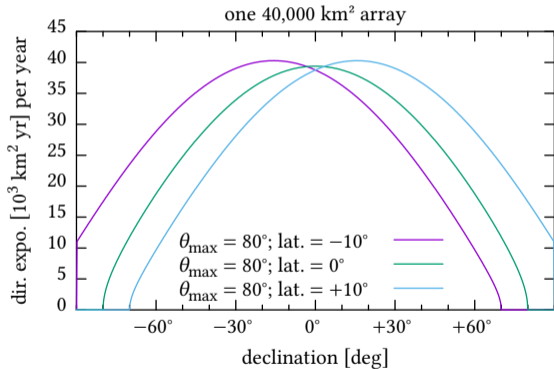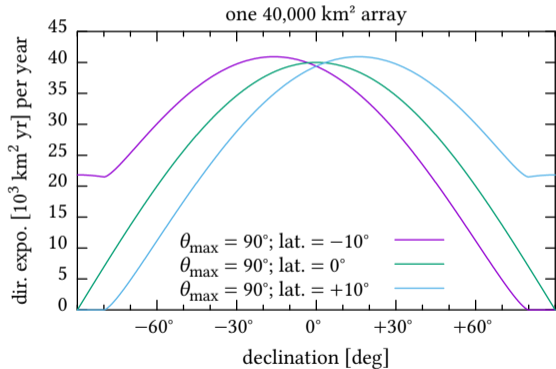`armando.dimatteo@to.infn.it`

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GCOS workshop 2022
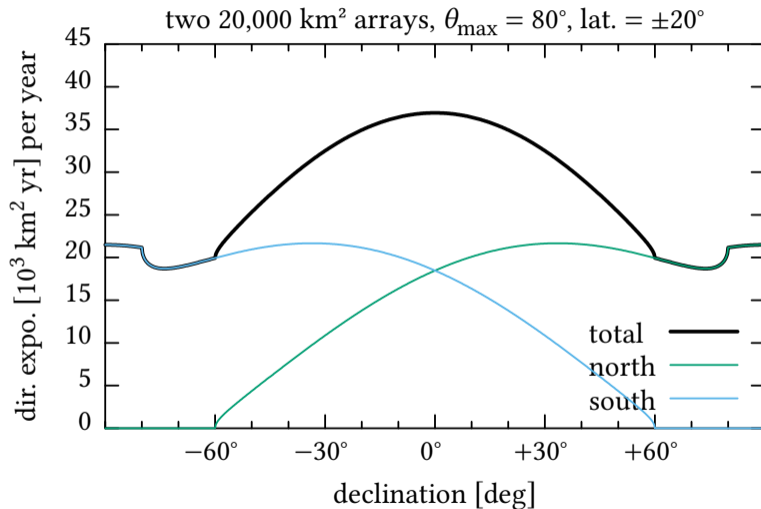13–15 July 2022, Wuppertal, Germany

- It's impossible to have full-sky coverage with one array even with $\theta_{max} = 90°$ unless *exactly* on the equator.
- With a more realistic $\theta_{max} = 85°$, full-sky coverage is not possible anywhere.

- It's impossible to have full-sky coverage with one array even with $\theta_{max} = 90°$ unless *exactly* on the equator.
- With a more realistic $\theta_{max} = 80°$, full-sky coverage is not possible anywhere.

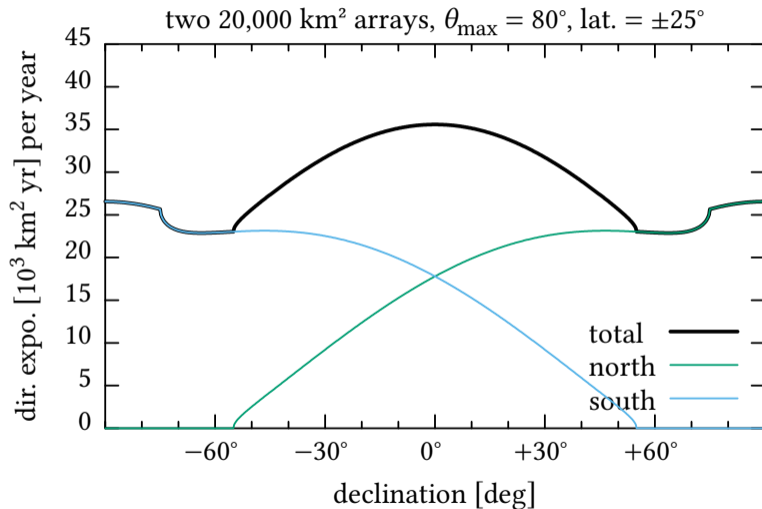one 40,000 km² array

$\theta_{max} = 90°$; lat. $= -10°$
$\theta_{max} = 90°$; lat. $= 0°$
$\theta_{max} = 90°$; lat. $= +10°$

$\theta_{max} = 80°$; lat. $= -10°$
$\theta_{max} = 80°$; lat. $= 0°$
$\theta_{max} = 80°$; lat. $= +10°$

- With *two* equal-size arrays, we can get reasonable full-sky coverage if they are at $\lambda \sim \pm 35°$.

two 20,000 km² arrays, $\theta_{max} = 80°$, lat. $= \pm 20°$

- With *two* equal-size arrays, we can get reasonable full-sky coverage if they are at $\lambda \sim \pm 35°$.

two 20,000 km² arrays, $\theta_{\max} = 80°$, lat. $= \pm 25°$

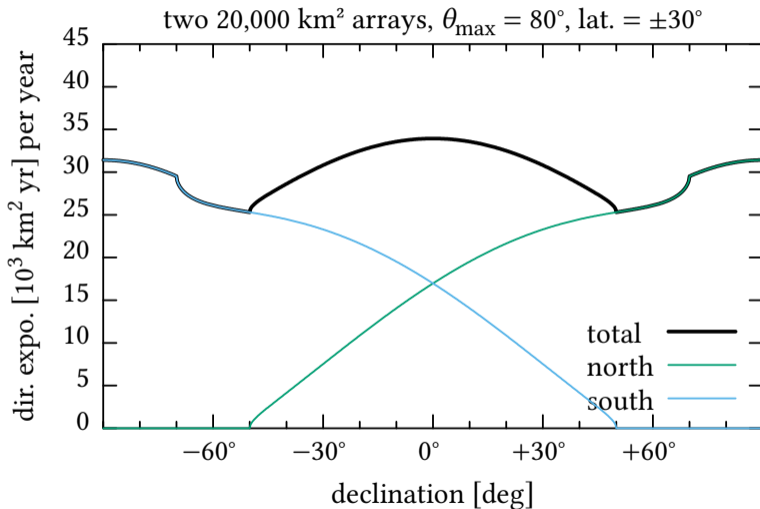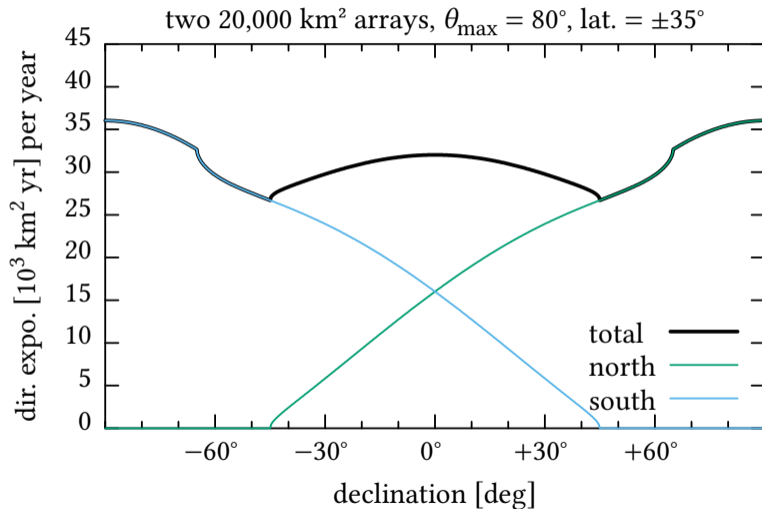Figure axes: dir. expo. [10^3 km² yr] per year vs declination [deg]

total — north — south

- With *two* equal-size arrays, we can get reasonable full-sky coverage if they are at $\lambda \sim \pm 35°$.

two 20,000 km² arrays, $\theta_{max} = 80°$, lat. $= \pm 30°$

- With *two* equal-size arrays, we can get reasonable full-sky coverage if they are at $\lambda \sim \pm 35°$.

two 20,000 km² arrays, $\theta_{max} = 80°$, lat. = $\pm 35°$

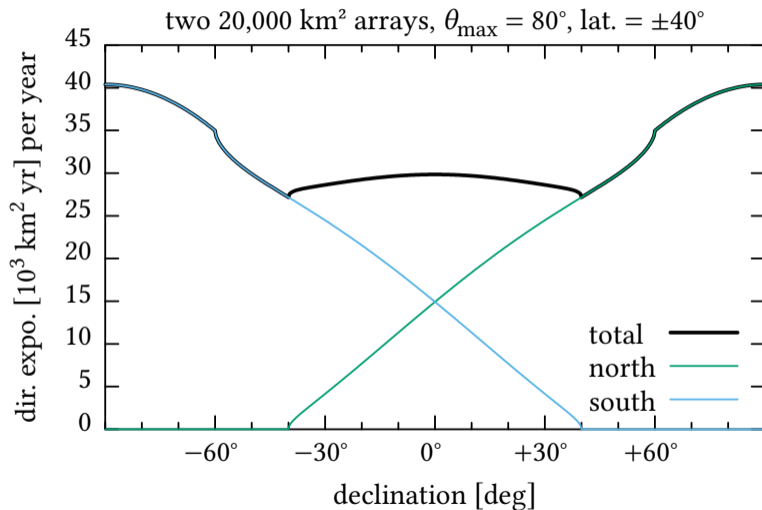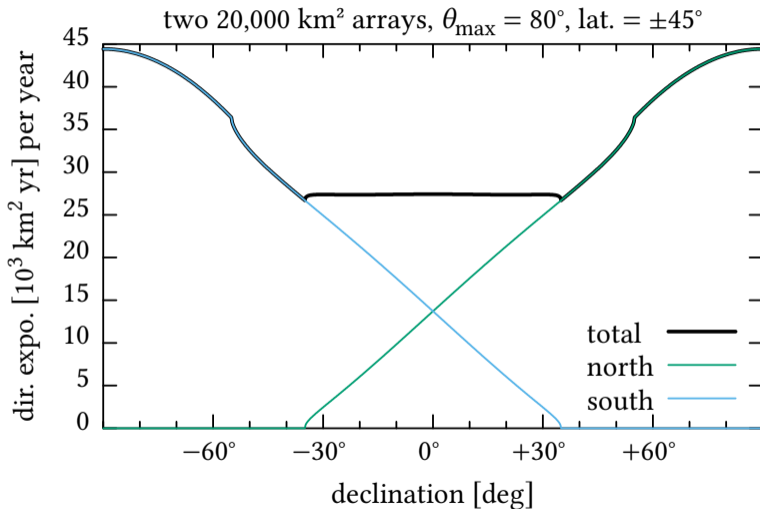- With *two* equal-size arrays, we can get reasonable full-sky coverage if they are at $\lambda \sim \pm 35°$.

two 20,000 km² arrays, $\theta_{\max} = 80°$, lat. $= \pm 40°$

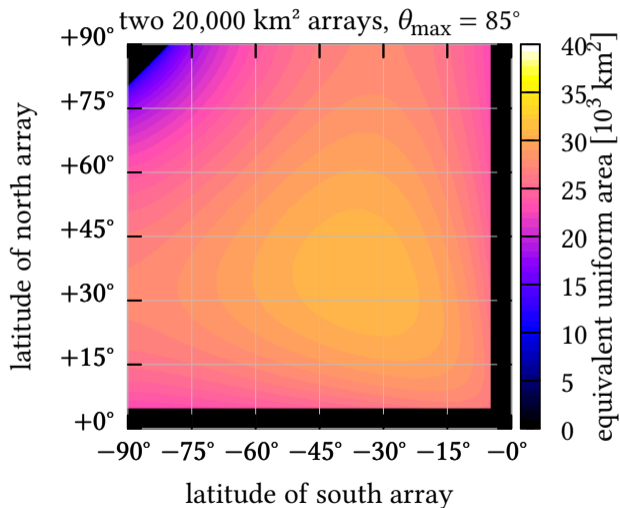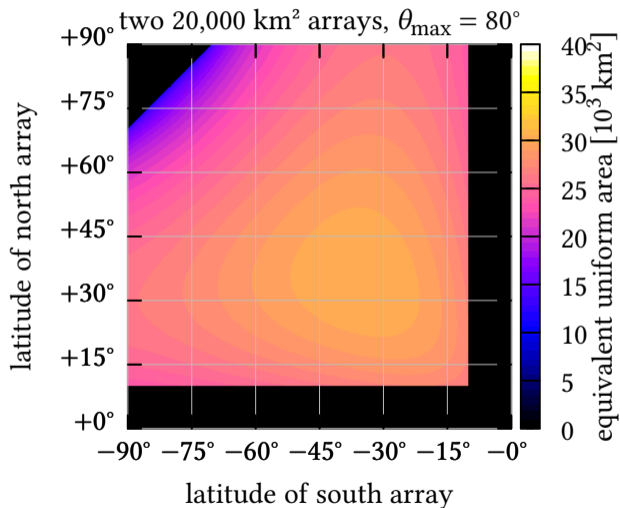dir. expo. [10^3 km² yr] per year vs declination [deg]

total — north — south

- With *two* equal-size arrays, we can get reasonable full-sky coverage if they are at $\lambda \sim \pm 35°$.

two 20,000 km² arrays, $\theta_{max} = 80°$, lat. $= \pm 45°$

- With a large θ_{max}, there's a wide range of latitudes at which to place the arrays with near-optimal coverage (see last year's talk for definitions).

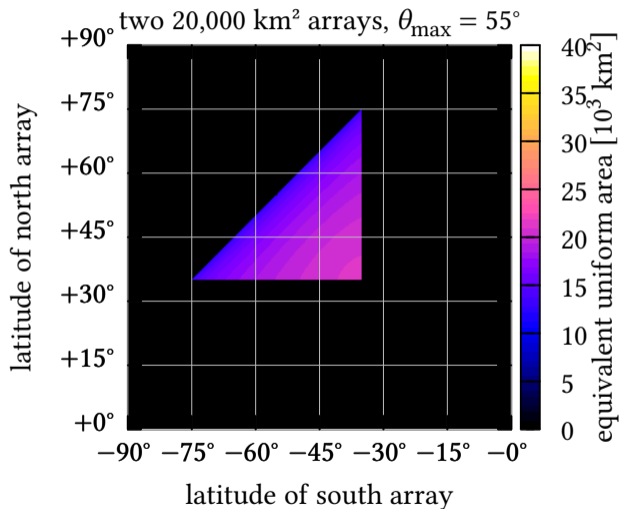two 20,000 km² arrays, $\theta_{max} = 85°$

- With a large θ_{max}, there's a wide range of latitudes at which to place the arrays with near-optimal coverage (see last year's talk for definitions).

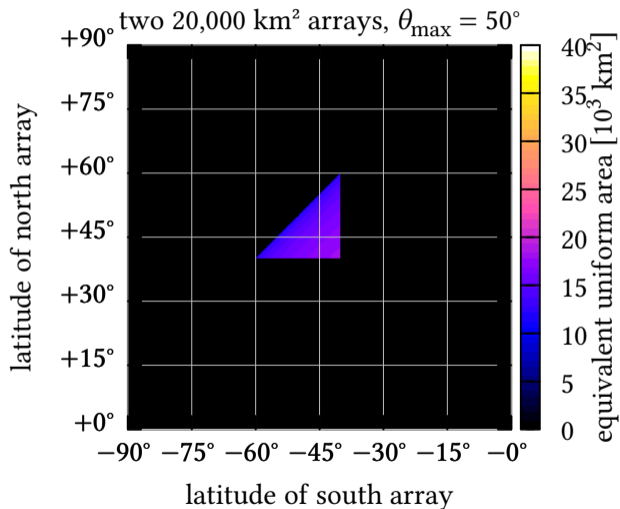two 20,000 km² arrays, $\theta_{max} = 80°$

- With a small $\theta_{\max}$, latitudes would have to be finely tuned.
  Let's not repeat Telescope Array's mistake and have scintillators only!

two 20,000 km² arrays, $\theta_{\max} = 55°$

- With a small θ_{max}, latitudes would have to be finely tuned.
  Let's not repeat Telescope Array's mistake and have scintillators only!

two 20,000 km² arrays, $\theta_{max} = 50°$

- Possibilities other than two equal arrays can be envisioned if it needs be.

36,000 + 4,000 km² arrays, $\theta_{\max} = 80°$

three arrays, one of which on the equator, $\theta_{\max} = 80°$