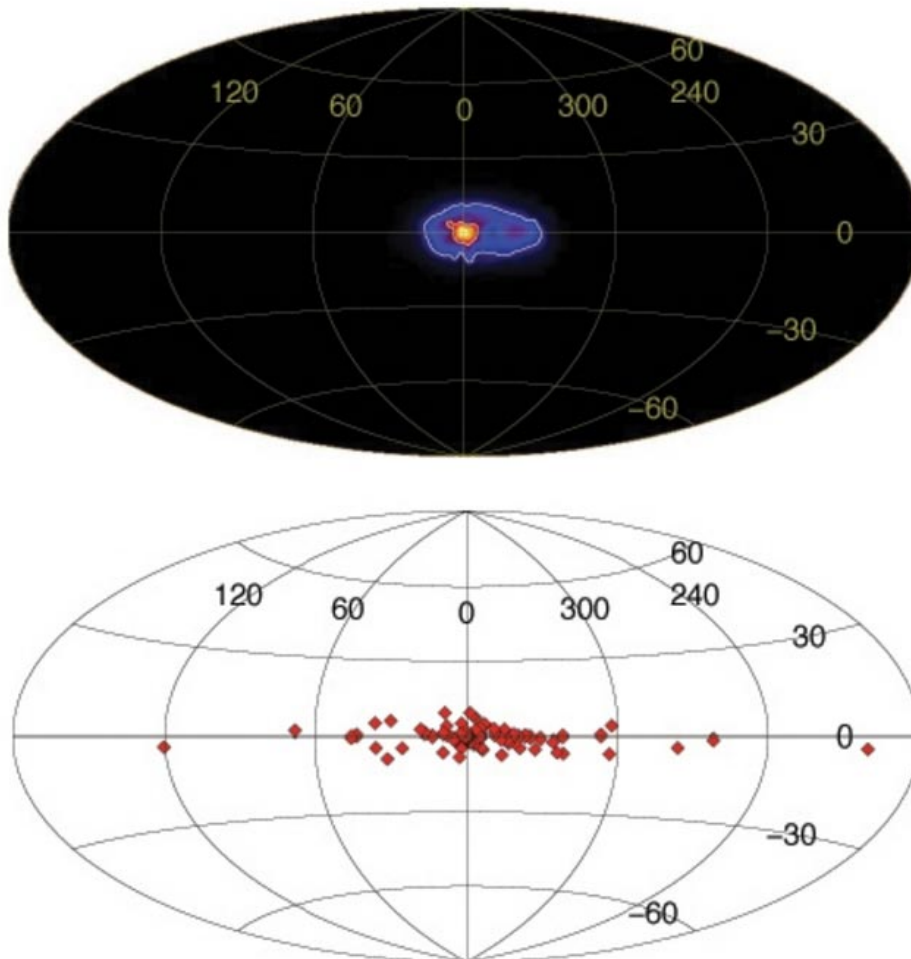


## Picture of the Month

February 2008



### New clues on the origin of Galactic positrons from INTEGRAL

Combining more than 4 years of observations, the inner Galaxy has now been mapped in the 511 keV positron annihilation line with unprecedented detail as shown above (top panel) using the SPI spectrometer. For the first time, positron annihilation is found to be asymmetric in the inner Galactic disk. Consistent with earlier findings, the annihilation emission is brightest around the Galactic center. In the sky maps, the Galactic center is at the origin and the Galactic disk runs along the equator.

The distribution of low-mass X-ray binaries (LMXBs) observed with the imager IBIS above 20 keV (bottom panel) is remarkably similar to that of the positron annihilation line. The resemblance of the two distributions suggests that hard X-ray emitting LMXBs may be a major source of positrons in our Galaxy. In the inner disk, they may account for most of the positrons, with a minor contribution from the radioactive isotope  $^{26}\text{Al}$  produced by massive stars.

In the bright central region, hard LMXBs may account for about half (and possibly all) of the observed positrons. Additional potential astrophysical positron sources include the supermassive black hole Sgr A\* and Type Ia supernovae. If hard LMXBs are indeed important positron sources, the need for exotic explanations, such as dark matter, is reduced.

Details of the work are described in G. Weidenspointner et al. *Nature* 451, 159, 2008.