THE GALACTIC CENTER – A LABORATORY FOR AGN

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1. Summary

In this short note, we summarize recent developments of the understanding of the physics of the Galactic Center. For a much more detailled compilation, we refer to our review paper (Mezger, Duschl & Zylka 1996, A&AR 7, 289) and to Beckert & Duschl (1997, A&A, *in press*).

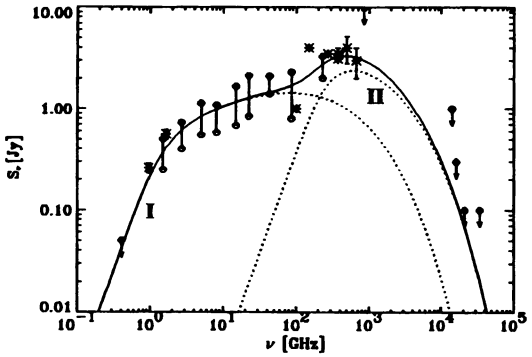
2. The Galactic Center ...

Sgr A* is a radio source which – to the best of our knowledge – is located at the dynamical center of the Galaxy. During the last few years several competing models for the interpretation of the spectrum of Sgr A* were developed some of which were discussed during this Symposium. As reliable flux measurements of Sgr A* are currently available only for the cm/mm/submm wavelengths range, the crucial test of the models has to be how well the models fit these observed fluxes. The different models pass this test with different levels of success (see the respective papers in this volume and in the pertinent literature).

Duschl and Lesch (1994, A&A 286, 431) proposed optically thin synchrotron radiation of monoenergetic relativistic electrons as the physical process giving rise to the observed spectrum. This model was worked out in more detail recently by Beckert and Duschl (1997, A&A, *in press*). In Figure 1 we show a representative fit to the observed flux densities S_ν using a core-shell model. The parameters are also given in the Figure.

A prediction resulting from such a core-shell model is that the observed source size of Sgr A* will decrease considerably for wavelength below $\sim 1\,\mathrm{mm}$ (roughly by up to an order of magnitude as compared to the ob-

Y. Sofue (ed.), The Central Regions of the Galaxy and Galaxies, 315-316.



Sgr A*	Component	
	I	II
E / MeV	155.	41.4
B / G	2.0	70.
R / 10^{11} cm	5.5	0.13
n / 10^{4} cm^{-3}	0.064	300.

Figure 1. A comparison of observations of Sgr A* (variability ranges, individual measurements, and significant upper limits) with a two component core-shell model (left panel). The characteristic parameters are given in the right panel.

served resolved VLBI source sizes at 3 and 7 mm) . The amount and wavelength dependence of this expected transition depends somewhat but not strongly on the model parameters and will be discussed elsewhere (Duschl and Beckert 1998, *in prep.*).

3. ... a Laboratory for AGN

Sgr A* is not the only source in the center of a galaxy exhibiting a spectrum like Sgr A*. Similar spectral dependencies are known, for instance, for M 81 (Reuter & Lesch 1996, A&A 310, L5), NGC 1068 (Wittkowski et al. 1997, A&A, *submitted*; and 1998, *this volume*), and M 104 (Jauch & Duschl 1998, *in prep.*), extending over wavelengths ranges that seem to correlate with the level of activity.

In all cases a sufficiently high spatial resolution turned out to be of crucial importance. In the case of NGC 1068, for instance, we achieved this by using an imaging technique which allows us to reach the diffraction limit (in our case, speckle masking interferometry) at one of the largest telescopes (in our case, the 6 m SAO telescope in Russia).

While the question of what causes the different levels of *efficiency of accelerating the relativistic electrons* is far from settled, it seems that there is a good chance that there is a common physical mechanism giving rise to the different levels of *activity in the centers of galaxies*, reaching at least from non-active galaxies, like ours one, to Seyfert galaxies, and perhaps beyond.