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# Heating of a molecular cloud by a primordial black hole

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The process of dust heating by photons from primordial black hole (PBH) in a molecular cloud with masses $M = 10^{16} - 10^{20}$ g has been considered. Under the assumption that dust particles are uniformly distributed in a spherically symmetric cloud and have sizes $a = 0.01, 0.02, 0.05$, and $0.1$ $\mu$m, the dust temperature as a function of the distance to the PBH was calculated. From the plots obtained, it follows that directly near the PBH the dust particles are heated to a temperature $T \leq 10^2$ K, and with increasing distance the temperature drops sharply. Thus, PBH can heat only a spherical layer of the molecular cloud whose radius $r$ does not exceed $10^3$ cm. In addition, the emission spectra of dust particles heated by PBH were constructed and it was shown how the spectra depend on the dust number density in the molecular cloud and on the particle size. The sensitivity plots of the planned Millimetron space observatory in the interferometer mode were superimposed on the obtained spectra and it was shown that in the presence of PBH in the cloud, it can be registered if the dust number density in the cloud is between $n_d = 10^{-4}$ cm$^{-3}$ and $n_d = 10^{-1}$ cm$^{-3}$ (with the size of individual dust particles in the cloud varying from $0.1$ to $0.01$ $\mu$m, respectively).

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