R19a　原始銀河からの水素分子輝線の観測可能性

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We study the H_2 cooling emission of forming galaxies, and discuss their observability using the future infrared facility *SAFIR*. Forming galaxies with mass $\lesssim 10^{11} M_\odot$ emit most of their gravitational energy liberated by contraction in molecular hydrogen line radiation, although a large part of thermal energy at virialization is radiated away by the H Lyα emission. For more massive objects, the degree of heating due to dissipation of kinetic energy is so great that the temperature does not drop below 10^4K and the gravitational energy is emitted mainly by the Lyα emission. Therefore, the total H_2 luminosity attains the peak value of $L_{H_2} \sim 10^{42}$ergs/s for forming galaxies whose total mass $M_{\rm tot} \sim 10^{11} M_\odot$. If these sources are situated at redshift $z \sim 8$, they can be detected by rotational lines of 0-0S(3) at 9.7μm and 0-0S(1) at 17μm by *SAFIR*. An efficient way to find such H_2 emitters is to look at the Lyα emitters, since the brightest H_2 emitters are also luminous in the Lyα emission.