

we derived dynamical masses of 6 globular clusters. The masses are all in the range of  $2 \times 10^5 - 10^6 M_{\odot}$  and these are compared with the masses calculated by the  $r^{1/4}$  law/virial theorem method. We then calculated mass to light ratio for all clusters.

### **A Study on Rotational Line Profiles of 5 Diatomic Molecules $C_2$ , CH, CN, MgH and TiO in Sunspots\***

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Theoretical profiles of a few selected rotational lines of  $C_2$ ( $\lambda 5075.2$ ), CH( $\lambda 4218.7$ ), CN( $\lambda 3864.3$ ), MgH( $\lambda 5150.2$ ) and TiO( $\lambda 5257.3$ ) are computed by using the current models of sunspot umbrae and penumbra. It is found that carbide lines are enhanced in *penumbrae* relative to umbrae, while MgH lines are more strongly enhanced in *umbrae* than in penumbra and the quiet sun. The resulting consequences are discussed with respect to the forthcoming observational programs at Sacramento Peak Observatory.

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### **Origin of Planetary Nebulae**

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Static models for giant star envelopes of  $L \geq 10^4 L_{\odot}$  are presented. The degree of density inversion in the convective zone of the giant star envelopes increases with the luminosity of the models eventually leading to a detached shell. The computed luminosity and effective temperature of the remnant star are found to be consistent with the observed values for the central stars of planetary nebulae. We suggest that planetary nebulae might be produced by this process.

### **Survival Probability of Neutrino Flux in Spherically Symmetric Neutron Stars**

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We calculated the probable amount of reduction in neutrino number density as a result of the capture by a neutron star. To simplify the problem, we assumed that a neutron star is in spherically symmetric, homogeneous, isotropic and steady states. In addition the influx of the neutrino was assumed homogeneous.

The reaction probability is calculated from the energy and mass distribution in our model, which is independent of time in P-space. Our result shows that the reaction probability of neutrinos inside the neutron star is negligible.

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