Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

**Optimal High-$T_C$ Superconductivity in $Cs_3C_{60}$** DALE HARSHMAN, College of William and Mary, ANTHONY FIORY, New Jersey Institute of Technology — The highest superconducting transition temperatures in the $(A_{1-x}B_x)_3C_{60}$ superconducting family are seen in the A15 and FCC structural phases of $Cs_3C_{60}$ (optimized under hydrostatic pressure), exhibiting measured values for near-stoichiometric samples of $T_{C0}^{meas.} = 37.8$ K and 35.7 K, respectively. It is argued these two Cs-intercalated $C_{60}$ compounds represent the optimal materials of their respective structures, with superconductivity originating from Coulombic $e$-$h$ interactions between the $C_{60}$ molecules, which host the $n$-type superconductivity, and mediating holes associated with the Cs cations. A variation of the interlayer Coulombic pairing model [Harshman and Fiory, J. Supercond. Nov. Magn. 28, 2967 (2015), and references therein] is introduced in which $T_{C0}^{calc.} \propto 1/\ell\zeta$, where $\ell$ relates to the mean spacing between interacting charges on surfaces of the $C_{60}$ molecules, and $\zeta$ is the average radial distance between the surface of the $C_{60}$ molecules and the neighboring Cs cations. For stoichiometric $Cs_3C_{60}$, $T_{C0}^{calc.} = 38.08$ K and 35.67 K for the A15 and FCC macrostructures, respectively; the dichotomy is attributable to differences in $\zeta$.

Dale Harshman
College of William and Mary

Date submitted: 05 Nov 2015 Electronic form version 1.4