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Diamond pixel modules

D. Asner [t], M. Barbero [a], V. Bellini [b], V. Belyaev [m], J-M. Brom [i], M. Bruzzi [e], D. Chren [u], V. Cindro [k], G. Claus [i], M. Cristinziani [a], S. Costa [b], R. D'Alessandro [f], W. de Boer [l], D. Dobos [c], I. Dolenc [k], W. Dulinski [i], J. Duris [r], V. Eremin [h], R. Eusebi [g], H. Frais-Kölbl [d], A. Furgeri [l], K.K. Gan [n], M. Goffe [i], J. Goldstein [s], A. Golubev [j], A. Gorišek [k], E. Griesmayer [c], E. Grigoriev [j], D. Hits [o], F. Hügging [a], H. Kagan [n,*], R. Kass [n], G. Kramberger [k], S. Kuleshov [j], S. Lagomarsino [f], A. La Rosa [c], A. Lo Giudice [p], I. Mandic [k], C. Manfredotti [p], C. Manfredotti [p], A. Martemyanov [j], M. Mathes [a], D. Menichelli [e], M. Mikuž [k], M. Mishina [g], J. Moss [n], S. Mueller [l], G. Oakham [t], P. Olivero [p], G. Parrini [f], H. Pernegger [c], R. Potenza [b], K. Randrianarivony [t], A. Robichaud [t], S. Roe [c], D. Schaffner [r], S. Schnetzer [o], T. Schreiner [d], S. Sciortino [f], S. Smith [n], B. Sopko [u], R. Stone [o], C. Sutera [b], W. Trischuk [q], J.-W. Tsung [a], C. Tuve [b], J. Velthuis [s], E. Vittone [p], R. Wallny [r], P. Weilhammer [c], N. Wermes [a], The RD42 Collaboration

[a] *Universität Bonn, Germany*
[b] *INFN/University of Catania, Italy*
[c] *CERN, Geneva, Switzerland*
[d] *Fachhochschule für Wirtschaft und Technik, Wiener Neustadt, Austria*
[e] *INFN/University of Florence, Italy*
[f] *Department of Energetics/INFN Florence, Italy*
[g] *FNAL, Batavia, USA*
[h] *Ioffe Institute, St. Petersburg, Russia*
[i] *IPHC, Strasbourg, France*
[j] *ITEP, Moscow, Russia*
[k] *Jožef Stefan Institute, Ljubljana, Slovenia*
[l] *Universität Karlsruhe, Karlsruhe, Germany*
[m] *MEPHI Institute, Moscow, Russia*
[n] *The Ohio State University, Columbus, OH, USA*
[o] *Rutgers University, Piscataway, NJ, USA*
[p] *University of Torino, Italy*
[q] *University of Toronto, Toronto, Canada*
[r] *UCLA, Los Angeles, CA, USA*
[s] *University of Bristol, Bristol, UK*
[t] *Carleton University, Ottawa, Canada*
[u] *Czech Technical University, Prague, Czech Republic*

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ABSTRACT

With the commissioning of the LHC in 2010 and upgrades expected in 2015, ATLAS and CMS are planning to upgrade their innermost tracking layers with radiation hard technologies. Chemical Vapor Deposition diamond has been used extensively in beam conditions monitors as the innermost detectors in the highest radiation areas of BaBar, Belle, CDF and all LHC experiments. This material is now being considered as a sensor material for use very close to the interaction region where the most extreme radiation conditions exist. Recently the RD42 collaboration constructed, irradiated and tested polycrystalline and single-crystal chemical vapor deposition diamond sensors to the highest fluences expected at the super-LHC. We present beam test results of chemical vapor deposition diamond up to fluences of 1.8×10^{16} protons/cm^2 illustrating that both polycrystalline and single-crystal chemical vapor deposition diamonds follow a single damage curve. We also present beam test results of irradiated complete diamond pixel modules.

* Corresponding author.
E-mail address: harris.kagan@cern.ch (H. Kagan).

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