Dear Editor,

please find below a detailed list of the changes we made to the manuscript. The bulk of the changes followed the comments of the referee (starting with "==>"), in the order in which they appeared in the referee report.
All added changes are marked in bold face in the resubmitted manuscript, for better understanding.

With best regards,

R. Rousseau

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Response to the referee:

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We appreciated the comments of the referee and would like to thank him/her. The comments are addressed in-line in the referee report below preceded by "==>".
All changes are marked in bold face in the resubmitted manuscript, for better understanding.

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Referee Report:

This paper presents an analysis of Fermi-LAT data on HESS J1857+026, discussing possible constraints on the viable models for the PWN.

The paper is generally well written.

In particular, the description of the Fermi-LAT data analysis (Section 3) is clear, precise and informative. I have two, rather minor, remarks about this part:

- the measurement error of the estimated gamma-ray luminosity (2.48E35 erg/s) should be given (by the way, I do not believe it is measured with 3 significant digits).

==> We updated the value in the text and in the abstract.

- the coefficients of the fit to the radio times of arrival should be given, with relative errors (this is necessary to evaluate Eq. 1).

==> We added the table 1 which contains the parameters of the fit to the radio TOAs with their 1 sigma error in parenthesis. The entire timing solution including all theses parameters will be made available through the FSSC.

The right amount of space is devoted to a description of X-ray data analysis (Section 4), even though here the authors could have been more precise:
- by giving the value of the X-ray flux measured for PSR J1856+0245, as well as the confidence level of this measurement;

==> The unabsorbed X-ray flux of the pulsar based on the XMM spectrum is $(8.3^{+2.5}_{-7.9})\times10^{-14}$ erg cm$^{-2}$ s$^{-1}$ in the 2-10 keV band (due to the high $N_H$, there are hardly any photons below 2 keV), assuming a power-law model. We updated the text with this new information.

- by explaining why a 2"-15" annular extraction region has been chosen. Is there any physical reason behind the choice of the upper radius of 15"?

By the way, I'm looking forward to see the forthcoming paper on the XMM data, because hopefully that one will present a more detailed, and constraining, study of the nebular X-ray emission.

==> The 15" outer radius was chosen based on the X-ray PWNe observed for pulsars with comparable E_dots by scaling their angular size with their distance. A good reference for this is the review article by Kargaltsev & Pavlov 2008 (arXiv:0801.2602v2) , in particular Tables 1 and 2. The inner 2" was chosen so as to minimize the contribution from the point-source pulsar emission.

Typo in this section: weel -> well.

==> We updated it in the text.

I appreciated Section 5, where a discussion is presented without pretending to attain results that could not be reached with the present data.
There are, however, a few points that need further clarification:
- regarding the evolution in size of the PWN, the authors adopt a linear expansion, followed by a phase in which R propto t0.3. But they do not say anything about the transition between the two regimes, if it is smooth or if it implies a strong compression of the PWN: my understanding is that the latter case should be correct;

==> The radius is assumed to evolve smoothly between linear and t^0.3 evolution. While it is true that the transition from free expansion to the Sedov phase may be accompanied by a PWN compression, this compression is highly dependent on a number of parametes (SN explosion energy, SN ejecta mass, ISM density, etc.) which are unconstrained. For simplicity, we therefore use a smooth transition at 10^4 years.

- actually, I do not even understand why the Sedov phase has been mentioned, since I expect that a PWN in pressure equilibrium with a Sedov shell would likely imply a field much larger than quoted 3-4 microG. Right?

==>In the Sedov phase a field of 3-4 microG is reasonable if one ignores possible compression from the reverse shock.

- a reason for having chosen B propto t-1.5 should be given. Just a fit to some numerical results? How does B change, when (if) the R propto t0.3 regime has been reached?

==>The value of B propto t^(-1.5) is taken from Van Etten & Romani 2011, where more detailed modeling found a t^(1-6) evolution of the mean magnetic field.

- to summarize the previous 3 points, a better explanation of the model would be appreciated.

==> We included all the previous explanations in the updated version of section 5.

- finally, a minor point: the (nominal) braking index should be evaluated from Eq. 1 with its (statistical) uncertainty.

==> The referee requested that we assign an uncertainty to the braking index estimate. Formally, we obtain 22.3 +/- 0.1 for the spindown model used to build the rotation ephemeris. This ephemeris was built to phase-fold gamma photons: adequately small phase residuals were obtained with 5 polynomial coefficients (F0...F4). Simplifying the model to three terms (F0, F1, F2) yields braking index n=29. The formal statistical errors poorly reflect the strong correlations in the data (for a discussion see http://cdsads.ustrasbg.fr/abs/2011MNRAS.418..561C ). Using 36 years of timing data for 366 pulsars, Hobbs, Lyne, and Kramer (2010) demonstrate clearly that "*the observed F2 values for the majority of pulsars are not caused by magnetic dipole radiation or by any other systematic loss of rotational energy, but are dominated by the amount of timing noise present in the residuals and the data span*." (Section 3.2.2 of http://cdsads.u-strasbg.fr/abs/2010MNRAS.402.1027H). For pulsars timed over 30 years, n ranges from -1701 to +36246.

We have changed our text to simply state n>20 and cite the work of Hobbs et al. 2010.

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==> In addition to the modifications kindly suggested by the referee, we have made some minor changes to make the paper clearer

==>We changed the value 1.520 GHz to 1.5 GHz

==> We updated equation 1 and the text with the new name of the rotational parameters of the pulsar.

==> We moved the last sentence of the second paragraph of section 4 to the end of the previous paragraph to follow the value of the unabsorbed flux we just added.

==>We updated the section 5 concerning the glitch explanation. We decided to cite a paper with a clearer explanation.

We changed the paragraph :

*« We obtained n>20. Large braking indices between glitches are common among Vela-like pulsars and are likely to be associated with glitch recoveries. These large values should not be interpreted as the long-term braking index due to secular spin evolution; these correspond to transient states caused by large glitch activity as discussed in Espinoza et al. (2011). Fig. 1 in Lyne et al. (1996) shows the evolution of nu(1) for the Vela pulsar. The slope of the curve corresponds to nu(2), which is proportional to n. After every glitch the slope is very large, relaxing slowly to high values between 30 and 60 among the observed relaxations until interrupted by a new glitch. The authors show that underlying a large glitch activity there is a long-term trend which actually corresponds to a very low braking index. »*

into

« We obtained n>20. Large braking indices between glitches are common among Vela-like pulsars and are likely to be associated with glitch recoveries. These large values should not be interpreted as the long-term braking index due to secular spin evolution but instead correspond to transient states caused by large glitch activity as discussed in section 3.2.2 of Hobbs et al. 2010. Dipole braking indices have been measured only for a few pulsars with the highest spindown rates (see Table 1 of Espinoza et al. (2011)). »

==>We removed the following reference which is not used anymore

Lyne, A. G., Pritchard, R. S., Graham-Smith, F., & Camilo, F. 1996, Nature, 381, 6582, 497

==> Finally we added the three following references :
Van Etten, A. & Romani, R. W., 2011, ApJ, 742, 62
Kargaltsev, O. & G. G. Pavlov, G. G. 2008, arXiv:0801.2602v2
Hobbs, G., Lyne, A. G., & Kramer, M. 2010, MNRAS, 402, 1022