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Declarations under Rule 4.17:

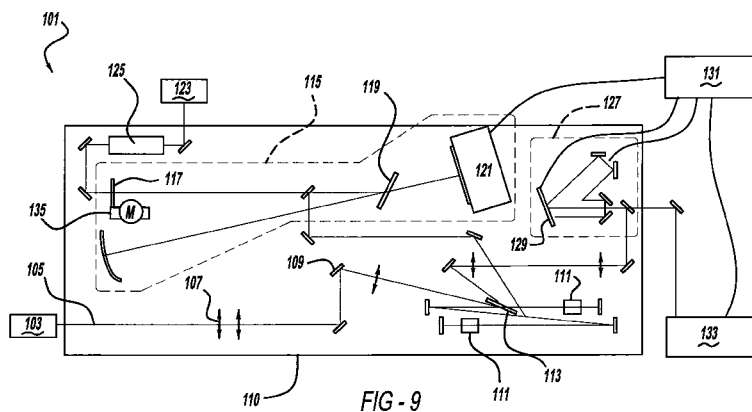
— of inventorship (Rule 4.17(iv))

Published:

- with international search report (Art. 21(3))
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))

(88) Date of publication of the international search report:
11 September 2009

(54) Title: CONTROL IN ULTRASHORT LASER SYSTEMS BY A DEFORMABLE MIRROR IN THE STRETCHER



(57) Abstract: A direct ultrashort laser system is provided. In another aspect of the present invention, a method of measuring laser pulse phase distortions is performed without requiring an adaptive pulse shaper or interferometry. In yet another aspect of the present invention, a system, a method of operating, a control system, and a set of programmable computer software instructions perform Multiphoton Intrapulse Interference Phase Scan processes, calculations, characterization and/or correction without requiring an adaptive pulse shaper. Pulse shaping may be performed by a deformable mirror (121) in a pulse stretcher (115).

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INTERNATIONAL SEARCH REPORT

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| International application No PCT/US2008/087707 |
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A. CLASSIFICATION OF SUBJECT MATTER
 INV. H01S3/00 H01S3/23
 ADD. H01S3/13

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H01S G01J

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, INSPEC, COMPENDEX

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|-----------|---|---|
| P, X | <p>WO 2007/145702 A (UNIV MICHIGAN STATE [US]; DANTUS MARCOS [US]) 21 December 2007 (2007-12-21)</p> <p style="text-align: center;">paragraphs [0023] - [0031]; figures 2-6 ----- -/--</p> | <p>1-4, 6, 8-11, 14, 16, 18-22, 24, 26-28, 30-36, 39, 41, 62-64</p> |

Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *&* document member of the same patent family

Date of the actual completion of the international search

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17/07/2009

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INTERNATIONAL SEARCH REPORT

International application No
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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|-----------|---|--|
| X | <p>US 2003/099264 A1 (DANTUS MARCOS [US] ET AL) 29 May 2003 (2003-05-29)</p> <p>paragraphs [0028] - [0043], [0062] - [0095], [0099] - [0126]; figures 1,10-20</p> <p>-----</p> | <p>1-4, 6-14, 16-22, 24-36, 39-41, 62-67</p> |
| X | <p>DANTUS MARCOS ET AL.: "MIIPS characterizes and corrects femtosecond pulses" LASER FOCUS WORLD, vol. 43, May 2007 (2007-05), pages 101-104, XP001539450</p> <p>page 101, right-hand column, paragraph 2 - page 103, right-hand column; figures 2-4</p> <p>-----</p> | <p>1,2, 8-12, 18-20, 26-28, 30-34, 36,41, 62-66</p> |
| X | <p>WO 2007/001308 A (UNIV MICHIGAN STATE [US]; DANTUS MARCOS [US]; LOZOVY VADIM V [US]; CO) 4 January 2007 (2007-01-04)</p> <p>paragraphs [0033] - [0050], [0054], [0055], [0060] - [0063]; figures 3,5,6A,8-12</p> <p>-----</p> | <p>1-4,6, 8-12,14, 16-22, 24-28, 30-36, 40,41, 62-64</p> |

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2008/087707

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

- 1. Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

- 2. Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

- 3. Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

- 1. As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

- 2. As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.

- 3. As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

- 4. No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-4, 6-14, 16-22, 24-36, 39-41, 62-67

Remark on Protest

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-4,6-14,16-22,24-36,39-41,62-67

Claims 1-4,6-14,16-22,24-36,39-41,62-67 comprise in common the determination and manipulation of the phase of a laser pulse.

2. claims: 5,15,23,37,38,42-61,68

Claims 5,15,23,37,38,42-61,68 comprise in common a deformable optic system manipulating a laser beam

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2008/087707

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|--|------------------|--------------------------------------|--------------------------|
| WO 2007145702 A | 21-12-2007 | NONE | |
| US 2003099264 A1 | 29-05-2003 | US 2009122819 A1 US 2004233944 A1 | 14-05-2009 25-11-2004 |
| WO 2007001308 A | 04-01-2007 | EP 1782452 A2 JP 2008505344 T | 09-05-2007 21-02-2008 |