L'anno duemilaquindici, addì **15 dicembre** alle ore 15.30, a seguito di regolare convocazione trasmessa con nota prot. n. 0081633 del 10 dicembre 2015, nell'Aula Organi Collegiali si é riunito il Senato Accademico per l'esame e la discussione degli argomenti iscritti al seguente ordine del giorno, come integrato con successiva nota rettorale prot. n. 0082528 del 15 dicembre 2015:

……..o m i s s i s ……

Sono presenti: il Rettore, prof. Eugenio Gaudio ed i componenti del Senato Accademico: prof. Masiani Pro Rettore Vicario, prof. Stefano Biagioni, prof.ssa Maria Rosaria Torrisi, prof.ssa Emma Baumgartner, prof. Davide Antonio Ragozzino, prof.ssa Alessandra Zicari, prof. Giorgio Graziani, prof. Stefano Catucci, prof. Giuseppe Piras, prof.ssa Stefania Portoghesi Tuzi, prof.ssa Beatrice Alfonzetti, prof.ssa Matilde Mastrangelo, prof. Alessandro Saggioro, prof. Giorgio Piras, prof. Emanuele Caglioti, prof.ssa Maria Grazia Betti, prof. Felice Cerreto, prof. Giorgio De Toma, prof.ssa Susanna Morano, prof. Marco Biffoni, prof. Giuseppe Santoro Passarelli (entra alle ore 16.46), prof. Augusto D'Angelo, prof. Mauro Rota, Rappresentanti del personale: Roberto Ligia, Beniamino Altezza, Tiziana Germani, Carlo D'Addio e i Rappresentanti degli studenti: Alessio Folchi, Matteo Catananti, Maria Giacinta Bianchi, Alessandro Cofone, Francesco Mosca, Tiziano Pergolizzi.

Assistono: il Direttore Generale, Carlo Musto D'Amore, che assume le funzioni di Segretario, i Presidi: prof. Giuseppe Ciccarone, prof. Paolo Ridola, prof. Fabrizio Vestroni, prof.ssa Anna Maria Giovenale, prof. Marco Listanti, prof. Vincenzo Nesi, prof. Stefano Pietro Luigi Asperti, prof.sa Raffaella Messinetti, prof. Cristiano Violani, prof. Sebastiano Filetti, prof. Vincenzo Vullo, Prof. Paolo Teofilatto, il prof. Alessandro Schiesaro, Direttore della Scuola di Studi Avanzati e i Prorettori: Teodoro Valente, Antonello Folco Biagini e Gianni Orlandi.

Assenti giustificati: il Rappresentante del personale Pietro Maioli.

Il Presidente, constatata l'esistenza del numero legale, dichiara l'adunanza validamente costituita ed apre la seduta.

……..o m i s s i s ……

SAPIENZA
UNIVERSITÀ DI ROMA

Senato Accademico
15 DIC. 2015

Programma per giovani ricercatori "Rita Levi Montalcini"
D.M. n. 1060 del 23 dicembre 2013

Il MIUR, con nota del 1 dicembre 2015, ha comunicato che, (in applicazione della procedura prevista dal D.M. n. 1060 del 10 settembre 2015), il Ministro ha approvato le liste di priorità presentate dal Comitato preposto alla valutazione e selezione delle proposte.
In particolare la dott.ssa **Elena Martinengo** ha scelto questo Ateneo in ordine di preferenza per lo svolgimento del programma di ricerca.
Il MIUR ha quindi invitato l'Università a voler trasmettere al Ministero la delibera del Consiglio di Amministrazione contenente l'impegno alla stipula del contratto di ricercatore a tempo determinato ai sensi dell'articolo 24, comma 3) lettera b) della legge 240/2010 e l'attestazione dei Dipartimenti a fornire adeguate strutture di accoglienza e di supporto, ovvero la dichiarazione che non è intenzione dell'Ateneo accogliere la richiesta, entro 45 giorni con scadenza quindi 15.01.2016 per la Dott.ssa Elena Martinengo.
Il programma di ricerca presentato dalla dott.ssa Martinengo ha il seguente titolo "Nuovi approcci allo studio locale di spazi di moduli di fasci: fasci localmente liberi e teoria delle dgla con struttura di Hodge, fasci su K3 e strutture simplettiche" riguarda i ss.dd. MAT/03 e MAT/02 e pertanto i Dipartimenti interessati potrebbero essere quello di Matematica e quello di Scienze di base e applicate per l'ingegneria.
A tal riguardo si fa presente di aver già trasmesso ai Dipartimenti interessati il Progetto di ricerca per le valutazioni di competenza.

Il Presidente ricorda che per i precedenti finanziamenti del Programma Rita Levi Montalcini il Senato Accademico ha deliberato di invitare i Direttori di Dipartimento ad organizzare un seminario per i vincitori e di delegare il Rettore, i Presidi di Facoltà ed i Direttori di Dipartimento competenti ad esaminare i curricula e a riferire al Senato Accademico, anche valutando la posizione ricoperta dai medesimi nell'Università estera e che sulla relazione per valutare l'eccellenza si esprimesse lo stesso Senato.

Considerata l'imminente scadenza del termine per la comunicazione al MIUR (15.01.2016) e che entro tale data non è prevista un'altra seduta del Senato, si propone di delegare i Direttori di Dipartimento e i Presidi di Facoltà ad organizzare un seminario per la dott.ssa Elena Martinengo, ad esaminare il curriculum e a valutare la posizione ricoperta dalla stessa nell'Università estera, esprimendosi sull'eccellenza scientifica entro il 22.12.2015, data ultima del Consiglio di Amministrazione.

SAPIENZA
UNIVERSITÀ DI ROMA

Senato Accademico

Seduta del

15

Il Presidente invita, pertanto, il Senato Accademico a deliberare in merito.

Allegati parte integrante:

- Proposta di contratto dott.ssa Elena Martinengo

SAPIENZA
UNIVERSITÀ DI ROMA

Senato Accademico

Seduta del

15 DIC. 2015

DELIBERAZIONE N. 548/15

IL SENATO ACCADEMICO

VISTO lo Statuto dell'Università;

VISTA la nota MIUR del 1.12.2015, prot. n. 14514;

LETTA la relazione istruttoria;

Con voto unanime

DELIBERA

di delegare i Direttori di Dipartimento e i Presidi di Facoltà ad organizzare un seminario per la dott.ssa Elena Martinengo, ad esaminare il curriculum e a valutare la posizione ricoperta dalla stessa nell'Università estera, esprimendosi sull'eccellenza scientifica entro il 22.12.2015, data ultima del Consiglio di Amministrazione.

Letto e approvato seduta stante per la sola parte dispositiva.

IL SEGRETARIO
Carlo Musto D'Amore

IL PRESIDENTE
Eugenio Gaudio

Programma Per Giovani Ricercatori

"Rita Levi Montalcini"

PROPOSTA DI CONTRATTO

Codice: PGR13XCCAH

DATI GENERALI STUDIOSO

Nome	*ELENA*
Cognome	*MARTINENGO*
Nato/a a	*TORINO*
il	*25/10/1981*
Nazionalità	*Italy*
Qualifica Dottore di ricerca o titolo equivalente o superiore	*Dottore di ricerca in Matematica*
Stato di provenienza attuale	*Germany*
Ente	*Freie Universität, Berlin*
Dottore di ricerca dal (tra il 1 novembre 2007 e il 31 ottobre 2010)	*13/01/2009*
Titolo conseguito presso	*Universita' La Sapienza, Roma*
Data inizio attività all'estero (non oltre il 24 aprile 2011)	*01/10/2010*

ATTIVITÀ DI DIDATTICA E/O DI RICERCA SVOLTE ALL'ESTERO NELL'ULTIMO TRIENNIO

nº	Dal	Al	Presso (indicare l'Ente)	In qualità di (specificare la tipologia di contratto)
1.	*01/10/2010*	*30/08/2014*		*Post Doc*

			Freie Universität, Berlin	

☑ **Dichiaro inoltre di non aver ricoperto alcuna posizione presso enti/istituzioni, universitarie e non, nel territorio dello Stato italiano.**

RECAPITO DELLO STUDIOSO

Indirizzo	*via Groscavallo 8*
CAP	*10138*
Città	*Torino*
Paese	*Italy*
Email	*elenamartinengo@gmail.com*
Telefono	*+4917699293223*

CURRICULUM SCIENTIFICO

Italiano

§ Education:
- Diploma di Maturità Scientifica (High School Degree), at Liceo Scientifico "A. Volta" in Turin, in July 2000, final mark 100/100 cum laude.
- Degree in Mathematics, at University of Turin, in September 2004, thesis on "Teoria geometrica della funzione Theta di Riemann", advisor Prof. Alberto Albano, final mark 110/110 cum laude.
- PhD degree, at University "La Sapienza", in Rome, in January 2009, thesis on "Moduli space of vector bundles and higher brackets", advisor Prof. Marco Manetti, final mark Optimum.

§ Positions and Fellowships:
- from September 2010: Post Doc position at "Freie Universität", Berlin.
- May 2009 - April 2010: Owner of a Reserch Grant in Deformation Theory at University "La Sapienza", Rome.
- November 2004 - December 2008: PhD student in Mathematics at University "La Sapienza", Rome.
- March 2007: Visitor at International School of Advanced Studies (ISAS), Trieste.
- October 2000 - September 2004: Undergraduate student in Mathematics at University of Turin.
- October 2001- September 2004: Winner of a scholarship granted by Istituto Nazionale di Alta Matematica "F. Severi" INdAM (National Institute of High Mathematics) to undergraduate

students in Matematics.

§ Conference Talks:
- "Local structure of the Brill-Noether stratification of the moduli space of flat and stable bundles", Congress "Progressi recenti in geometria reale e complessa", Levico Terme, Trento (Italy), 20th October 2008;
- "Infinitesimal deformations of Hitchin pairs and Hitchin map", Workshop "Giornate di Geometria Algebrica e argomenti correlati", Gargnano del Garda, Brescia (Italy), 25th - 29th May 2010; Conference Géométrie Algébrique en Libérté, Coimbra (Portugal), 7th-11th June 2010.
- "A new perspective on deformations of complex manifolds", North German Algebraic Geometry Seminar, "Carl von Ossietzky" Universität, Oldenburg (Germany), 19th November 2010; "Christmas Workshop" at Dipartimento di Matematica "F. Enriques", Milano (Italia), 17th December 2010.

§ Selected Invited Seminars:
- "Differential graded Lie algebras and deformations of bundles" and "Deformation functor associated to a morphism of differential graded Lie algebras",
Algebraic Geometry Seminar at International School for Advanced Studies (ISAS), Trieste (Italy), 13th and 20th March 2007.
- "Deformation theory via differential graded lie algebras: deformations of a complex manifold, of a holomorphic fibre bundle and of a pair (manifold, bundle) I-II."
PhD Students Seminar at University of "RomaTre", Rome (Italy), 15th May 2008.
- "Local structure of the Brill-Noether stratification of the moduli space of flat and stable bundles", Algebraic Geometry Seminar at University of Torino (Italy), 11th November 2009; Algebraic Geometry Seminar at University of Trento (Italy), 26th November 2009.
- "An overview on deformation theory: from classical tecniques to infinity groupoids", Algebraic Geometry Seminar at Freie Universitat, Berlin, 19th May 2010.
- "Infinitesimal deformations of Hitchin pairs and Hitchin map", Algebraic Geometry Seminar at University of RomaTre, Roma (Italy), 29th April 2010.
- "Mori Dream stacks", Dipartimento di Matematica dell'Universita di Torino, 25th September 2013.
- "Intrinsic normal cone and obstructions", Department of Mathematics, University of Stavanger, Norway, 13th and 14th March 2014.

§ Selected Conferences and Schools:
- "School and Workshop on Moduli Spaces", organized by Centro Matematico De Giorgi, Pisa (Italy), 16th-28th June 2008.
- Workshop: "Algebraic and Geometric Deformation Spaces" , Max Planck Institute for Mathematics, Bonn (Germany), 10th-15th August 2008.
- "School (and Workshop) on the Geometry of Algebraic Stacks" , organized by Centro Internazionale per la Ricerca Matematica CIRM (International Center for Mathematical Research), Povo-Trento (Italy), 1st-6th September 2008.
- School and Conference on Moduli spaces and modular forms", organized by Berlin Mathematical School, Berlin, 21st-29th August 2009.
- "Advanced school on homotopy theory and algebraic geometry", organized by Insituto Universitario de Investigacion de Matematica (IMUS), Sevilla, 7th-12th September 2009.
- "Workshop in Deformation Theory II", Università di Roma "La Sapienza", Roma, 30th August - 3rd September 2010.
- "Summer school on Moduli of curves and Gromov-Witten Theory", Institut Fourier, Grenoble (France), 20th June - 1st July 2011.
- Workshop: "Toric Geometry", Oberwolfach (Germany), 15th - 21st April 2012.
- "Summerschool on Geometry of moduli", Sophus Lie Conference center, Nordfjordeid (Norway), 11th-15th June 2012.
- "Winter School on the Geometry of Sheaves in Low Dimensions", Centro Stefano Franscini, Ascona (Switzerland), 21st - 25th January 2013.

§ Teaching:
- During my PhD and my research grant at University "La Sapienza", in Rome, I hold the problem sessions for the following courses:
Analysis and Linear Algebra (Faculty of Biology), WS 05-06, 06-07, 07-08,
Institutions of Mathematics (Faculty of Geology), WS 06-07, 09-10.
Linear Algebra (Faculty of Mathematics), WS 07-08.
Analytic Geometry (Faculty of Mathematics), WS 08 -09.
Linear Algebra (Faculty of Statistic), WS 08-09, SS 09.
- During my Post Doc position at Freie Universität in Berlin, I hold the problem sessions for the following courses at the Institute of Mathematics:
Linear Algebra, WS 10-11, SS 11, WS 11-12 (in English, later in German).
Algebraic Geometry, WS 11-12 (in English).
Elementar Geometry, SS 12 (in German).
Algebra and Number Theory, WS 12-13 (in German).
Analysis I-II, WS 13-14, SS 14 (in German).
-During my Post Doc position at Freie Universität in Berlin, I taught as co-holder for the course at the Institute of Mathematics:
Computer Algebra, March 2012, March 2013, March 2014 (in German).
During my Post Doc position at Freie Universität in Berlin, I hold the following students seminars at the Institute of Mathematics:
On Syzygies I-II, SS 13 (in German).
Homological algebra, SS 14 (in German).

Inglese
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Analytic Geometry (Faculty of Mathematics), WS 08 -09.
Linear Algebra (Faculty of Statistic), WS 08-09, SS 09.
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Elementar Geometry, SS 12 (in German).
Algebra and Number Theory, WS 12-13 (in German).
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On Syzygies I-II, SS 13 (in German).
Homological algebra, SS 14 (in German).

PUBBLICAZIONI SCIENTIFICHE

Publications:

D. Fiorenza, M. Manetti, E. Martinengo: Semicosimplicial DGLAs in deformation theory. Communications in Algebra, Vol. 40, No.6 (2012).
Preprint:arXiv:0803.0399.

E. Martinengo: Local structure of Brill-Noether strata in the moduli space of flat stable bundles. Rend. Sem. Mat. Univ. Padova, Vol. 121, (2009).
Preprint: arXiv:0806.2056.

D. Fiorenza, D. Iacono, E. Martinengo: Differential graded Lie algebras controlling deformations of a coherent sheaf. Journal of the European Mathematical Society, Vol. 14, No. 2 (2012).
Preprint: arXiv:0904.1301.

D. Fiorenza, E. Martinengo: A short note on infinity-groupoids and the period map for projective manifolds. Publications of the nLab, Volume 2, no.1 (2012).
Preprint: arXiv:0911.3845.

E. Martinengo: Infinitesimal deformations of Hitchin pairs and Hitchin map. International Journal of Mathematics. Vol. 23, No. 7 (2012).
Preprint: arXiv:1003.5531.

Preprints:
A. Hochenegger, E. Martinengo: Mori Dream Stacks. Preprint: arXiv:1403.7984.

PROGRAMMA DI RICERCA

Area Scientifico Disciplinare	*01 - Scienze matematiche e informatiche*	
Settori scientifico-disciplinari	*MAT/03 - Geometria*	*MAT/02 - Algebra*
Settori ERC	*PE1_4 - Algebraic and complex geometry*	*PE1_5 - Geometry*
Titolo del Programma di Ricerca (in italiano)	*Nuovi approcci allo studio locale di spazi di moduli di fasci: fasci localmente liberi e teoria delle dgla con struttura di Hodge, fasci su K3 e strutture simplettiche.*	
Titolo del Programma di Ricerca (in inglese)	*New approaches to the local study of moduli space of sheaves: locally free sheaves and Mixed Hodge dgla theory, sheaves on K3 surfaces and n-shifted symplectic structures.*	

PAROLE CHIAVE

Italiano

1. *teoria delle deformazioni e spazi di moduli*
2. *dgla e algebre L-infinito*
3. *spazi di moduli di fasci localmente liberi*
4. *spazi di moduli di fasci su K3*
5. *strutture di Hodge e strutture di Hodge Mixed*
6. *formalità*
7. *spazi di moduli derivati*
8. *strutture simplettiche*

Inglese

1. *deformation and moduli theory*
2. *dglas and L-infinity algebras*
3. *moduli space of locally free sheaves*
4. *moduli space of sheaves on K3 surfaces*
5. *Hodge and mixed Hodge structures*

6. *formality*
7. *derived moduli spaces*
8. *n-shifted symplectic structures*

DESCRIZIONE DEL PROGRAMMA DI RICERCA

Italiano

§ Contest of the research and plan:

§ Deformation theory and differential graded Lie algebras:
Deformation theory concerns with the study of variations of any algebro-geometric object or structure. Even if the attemp to "deform" geometric objects goes back quite to the origin of algebraic geometry, the correct understanding of what "deforming" means leads to some of the deepest tecnical stuff of this field.
The classical approach to deformation theory, developed by Artin, Grothendieck and many others, consists in associating a functor Def_X: Art_k --> Grpd to any algebro-geometric object X one wants to deform. Let A in Art_k be a local Artinian algebra over a field k (algebraically closed and of characteristic zero), Def_X(A) is defined to be the groupoid of infinitesimal deformations of X over the parameter space Spec A. This functor reflects the local structure of the moduli space of the kind of objects in question, if it exists.
The differential graded Lie algebra's approach to deformation theory, developed by Deligne, Drinfeld, Kontsevich and Quillen, consists in associating a dgla to any algebro-geometric deformation problem (see [Man]). A differential graded Lie algebra (dgla) L is a graded vector space, with a differential and a Lie bracket, that satisfy the graded Leibniz's and Jacobi's rules. For every dgla L, a deformation functor Def_L:Art_k --> Grpd can be defined as having as objects the solutions of the Maurer-Cartan equation and as isomorphisms the one given by the gauge action. The philosophy underlying this approach is that a dgla is associated to a deformation problem in such a way that the functor of infinitesimal deformations of the object is isomorphic to the deformation functor of the dgla. The main advantage of this method is that dglas translate geometric deformation problems in an easier algebraic language.

§ Research project on Filtered and Mixed-Hodge deformation theory (with Joana Cirici - Free University of Berlin):
The possible uses of dglas in deformation theory are very wide, here I would like to concentrate myself on the study of singularities of moduli spaces of locally free sheaves.
In their foundational paper [GM], Goldman and Millson developed the base tools for the dgla-deformation theory. They defined and studied the Kuranishi space associated to a dgla. If the dgla is associated to a geometric object, its Kuranishi space is the base of a versal deformation of it and it has an important role in the local study of the moduli space. In their works, Goldman and Millson proved that, if the dgla is formal, i.e. there exists a quasi-isomorphism between the dgla and its cohomology, the Kuranishi space is isomorphic to a quadratic cone in H^1(L).
A very important application of this result is their local study of the moduli space M of flat stable locally free sheaves on a compact Kähler manifold X. It is known that a coarse moduli space of these sheaves can be constructed by geometric invariant theory and that it is a complex analytic space. The dgla that controls deformations of such a locally free sheaf E is the algebra A^{0,*}_X(End E) of anti-holomorphic forms with values in the endomorphisms of E. Goldman and Millson proved that on a compact Kähler manifold it is formal. Their proof is based on the

existence of Hodge structures on the cohomology of a compact Kähler manifold and on a Lie algebra version of the the formality theorem of Deligne-Griffiths-Morgan-Sullivan [DGMS].For compact Kähler manifolds it states the existence of a quasi-isomorphism between the real de Rham algebra of forms and its cohomology. Putting all together, M turns out to have quadratic algebraic singularities, that is, it is locally defined by finitely many quadratic polynomials.
Quite recently Eyssidieux and Simpson in [ES] extended part of Goldman and Millson's theory to the filtered setting. They defined filtered dglas, filtered Maurer-Cartan and deformation functors associated to them. Under similar conditions for the dgla as in the classical case and with an hypothesis on the filtration, they proved the existence of a filtered formal local artinian algebra that represents the filtered deformation functor. As a consequence, they get a natural filtration on the Kuranishi space. Their main motivation for starting filtered deformation theory is the local study of a moduli space of representations.
In [P] Pridham worked in this direction too. He left the Kähler setting and studied the moduli space of representations of the fundamental group of a smooth algebraic variety. In this case, ordinary Hodge structures do not exist and the main tool becomes the existence of mixed Hodge structures. Using Morgan's theory of mixed Hodge diagrams [M], Pridham proved that the moduli space of such representations has locally mixed Hodge structures and that the equations, that defined it locally, have degree at most 4.
In a work in progress in collaboration with Joana Cirici, we extend classical deformation functors and dglas theory to the filtered and mixed Hodge setting and generalize Goldman and Millson's and Schlessinger's theory. In particular we are interested in analysing the Kuranishi space of a dgla with mixed Hodge structures, that satisfies a filtered formality property. Such a dgla is defined to be filtered formal, if there exists a quasi-isomorphism between it and the first term of the spectral sequence associated to its filtration.
Our main aim is to use these tools to generalize Goldman and Millson's formality results of [GM] to the smooth case, in the same spirit of Pridham's work [P].
In the case of smooth algebraic varieties the existence of mixed Hodge structures will play the role played by Hodge structures in the Kähler case and formality will be replaced by filtered formality. Indeed, Morgan proved in [M] that there exists a quasi-isomorphism between the real de Rham algebra of forms of a smooth projective algebraic variety and the first term of the spectral sequence associated to the weight filtration.
Putting together these ingredients we expect to describe the local structure of the moduli space of locally free sheaves on a smooth algebraic variety.

§ Research project on singularity of moduli space of semistable sheaves on a K3 surface (with Timo Schürg - University of Augsburg):
Moduli spaces M of semistable sheaves on complex projective K3 surfaces X are constructed by geometric invariant theory too. The locus parametrizing stable sheaves in such a moduli space is smooth and carries a natural non-degenerate holomorphic 2-form. In particular, when the Mukai vector is primitive, there are no strictly semistable sheaves and the moduli space is a holomorphic symplectic manifold. The description is not complete when the Mukai vector is non-primitive: then closed points of M are in one-to-one correspondence with polystable sheaves.
As already discussed the dgla approach could help in understanding the local structure of the moduli space M. It is quite classical that the dgla RHom(E,E) controls deformations of a sheaf E; note that if E is locally free, the dgla A^{0,*}(End E) mentioned previously is a possible incarnation of it.
There are some quite recent results in this direction. In [KL] Kaledin and Lehn conjectured that, if X is a complex projective K3 surface and H a generic polarization, for every polystable sheaf E the dgla RHom(E,E) is formal. They proved it in the special case E=I_Z^n, where mathcal I_Z is the ideal sheaf of a 0-dimensional subscheme Z of X. Later in [Z] Zhang proved the conjecture for E = bigoplus_iE_i^{n_i}, where the stable summands E_i either have all rank >2 or they are all line bundles. The techniques used by these authors are essentially the same. The key ingredient is the application of Kaledin's theorem of formality in families (see cite[K]).
In a research project in collaboration with Timo Schürg, we aim to prove Kaledin-Lehn's conjecture for all ranks. If it was proved true, it would be possible to list the singularities types which appear in the moduli spaces of semistable sheaves on K3 surfaces.

The approach we are interested in is totally different from the one of Kaledin-Lehn and Zhang: it involves the derived structure of the derived moduli space of sheaves.
Recently Pantev, Toën, Vaquié and Vezzosi in [PTVV] introduced the notion of n-symplectic structures on derived Artin n-stacks. They can be viewed as an extension of the usual notion of symplectic structures on smooth schemes, on one hand, to higher algebraic stacks and, on the other hand, to derived schemes and derived stacks. They proved three strong existence results, that led them to the existence of many examples of derived moduli stacks equipped with n-symplectic structures. In particular the first one of these theorems assures that the derived moduli stack of sheaves on a K3 surface has a 0-shifted symplectic structure. From it, they obtained a (-1)-shifted symplectic structure on the cotangent complex at the points corresponding to each E, that is a shift of the dgla RHom(E,E). Actually their result is more general and allows to construct such structures for Calabi-Yau variety of dimension d.
After studing deeply these shifted symplectic structures and the great amount of structure they have, we want to concentrate ourselves on dglas equipped with a (-1)-shifted symplectic structure, in particular, trying to understand under which conditions such a dgla is formal. If we get a criterion for dglas with a (-1)-shifted symplectic structure to be formal, the extra structure on the moduli space of sheaves over a K3 surface will lead us to a deeper understanding of Kaledin-Lehn's Conjecture.

§ Methodological approach:
My research project consists in studying locally some moduli spaces of sheaves: locally free sheaves on smooth varieties, in order to generalise Goldman and Millson's results [GM], and semistable sheaves on complex projective K3 surfaces, aiming to understand Kaledin and Lehn's conjecture [KL]. These topics are clearly very closed to each other and also the methods of investigation we are planning to use to tackle these problems are very similar.
To analyse locally moduli spaces of sheaves, we follow the dgla's approach to deformation theory. As already recalled, the philosophy underlying this method consists in associating a dgla to any algebro-geometric deformation problem in such a way that the functor of infinitesimal deformations of the algebro-geometric object is isomorphic to the deformation functor of the dgla. Thus, much information about the local structure of the moduli space under study can be obtained from the algebraic properties of the dgla. In particular, Goldman and Millson's tecniques [GM] allow to describe the equations of the Kuranishi space associated to the dgla and, under some hypothesis on the dgla, e.g. if it is formal, the description turns out to be very explicit.
We aim to improve Goldman and Millson's tecniques and methods to the mixed Hodge setting. In particular, in our work we consider dglas endowed with a filtered or mixed Hodge structures and we can describe how these extra structures transfer naturally on the Kuranishi space. We aim to get a more explicit description of the Kuranishi space under some hypothesis for the dgla, in particular in the case the filtered dgla is filtered formal. The tecniques we used here come from dgla theory: very useful sources of inspiration are classical articles on dglas of Manetti, Goldman-Millson and Schlessinger, together with a new article of Eyssidieux-Simpson [ES].
This extension of Goldman and Millson tecniques is our main tool to tackle the local study of the moduli space of locally free sheaves on a smooth variety. Indeed, on a smooth variety the dgla that controls deformations of a locally free sheaf is filtered and, by Morgan's theorem [M], it turns out to be quasi-isomorphic to the first term of the spectral sequence associated to its filtration, i.e. it is filtered formal.
The starting point for the local study of the moduli space of semistable sheaves on a K3 surface is again the dgla approach to deformations and the consequent description of the Kuranishi space. Also in this case we aim to understand more on the local structure of the moduli space using an extra structure, the dgla controlling the deformations of sheaves is endowed with for K3 surfaces.
Recently Pantev, Toën, Vaquié and Vezzosi [PTVV] introduced the notion of n-symplectic structures on derived Artin n-stacks. As an example, they proved that the derived moduli stack of sheaves on a K3 surface has a 0-shifted symplectic structure, from which they obtained a (-1) -shifted symplectic structure on the cotangent complex at each point, that is a shift of the dgla controlling deformations of sheaves. We aim to transfer the shifted symplectic structure on the

dgla to the Kuranishi space. In particular, we are interested in the case the dgla is formal, that would be the one for which the conjecture is true.
The tecniques involved come not only from the dgla approach to deformation theory but also from derived algebraic geometry, the basic works of Töen, Vaquié and Vezzosi give us the main tools. Since we are restricting our investigation to a very easy example of shifted symplectic structure, we belive that the derived methods will semplify a lot.

§ Work plan:
Research project on Filtered and Mixed-Hodge deformation theory:
Estension of the classical deformation functors and dglas theory to filtered and mixed Hodge theory (done).
Transfer of mixed Hodge structure from a dgla to the Kuranishi space (in progress).
Analysis of the dgla that controls deformations of locally free sheaves on a smooth variety as filtered dgla: proof that it is filtered formal using Morgan's theorem.
Consequent analysis of the moduli space of locally free sheaves on a smooth variety.
Research project on singularity of moduli space of semistable sheaves on a K3 surface:
Study of the article of Pantev, Töen, Vaquié and Vezzosi [PTVV], in particular of the example of the 0-shifted symplectic structure on the moduli stack of sheaves on a K3 surface (done).
Transfer of the 0-shifted symplectic structure on the moduli stack of sheaves on a K3 surface to the (-1)-shifted symplectic structure on the dgla that controls deformations of a sheaf and to the Kuranishi space (in progress).
Develop of some formality criterion for dglas with (-1)-shifted symplectic structure (in progress).
Consequent analysis of the moduli space of sheaves on a K3 surfaces.

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[Z] Z.Zhang, Note on formality and singularities of moduli space. ArXiv:1011.4689.

Inglese
§ Contest of the research and plan:

§ Deformation theory and differential graded Lie algebras:
Deformation theory concerns with the study of variations of any algebro-geometric object or structure. Even if the attemp to "deform" geometric objects goes back quite to the origin of algebraic geometry, the correct understanding of what "deforming" means leads to some of the deepest tecnical stuff of this field.

The classical approach to deformation theory, developed by Artin, Grothendieck and many others, consists in associating a functor Def_X: Art_k --> Grpd to any algebro-geometric object X one wants to deform. Let A in Art_k be a local Artinian algebra over a field k (algebraically closed and of characteristic zero), Def_X(A) is defined to be the groupoid of infinitesimal deformations of X over the parameter space Spec A. This functor reflects the local structure of the moduli space of the kind of objects in question, if it exists.
The differential graded Lie algebra's approach to deformation theory, developed by Deligne, Drinfeld, Kontsevich and Quillen, consists in associating a dgla to any algebro-geometric deformation problem (see [Man]). A differential graded Lie algebra (dgla) L is a graded vector space, with a differential and a Lie bracket, that satisfy the graded Leibniz's and Jacobi's rules. For every dgla L, a deformation functor Def_L:Art_k --> Grpd can be defined as having as objects the solutions of the Maurer-Cartan equation and as isomorphisms the one given by the gauge action. The philosophy underlying this approach is that a dgla is associated to a deformation problem in such a way that the functor of infinitesimal deformations of the object is isomorphic to the deformation functor of the dgla. The main advantage of this method is that dglas translate geometric deformation problems in an easier algebraic language.

§ Research project on Filtered and Mixed-Hodge deformation theory (with Joana Cirici - Free University of Berlin):
The possible uses of dglas in deformation theory are very wide, here I would like to concentrate myself on the study of singularities of moduli spaces of locally free sheaves.
In their foundational paper [GM], Goldman and Millson developed the base tools for the dgla-deformation theory. They defined and studied the Kuranishi space associated to a dgla. If the dgla is associated to a geometric object, its Kuranishi space is the base of a versal deformation of it and it has an important role in the local study of the moduli space. In their works, Goldman and Millson proved that, if the dgla is formal, i.e. there exists a quasi-isomorphism between the dgla and its cohomology, the Kuranishi space is isomorphic to a quadratic cone in H^1(L).
A very important application of this result is their local study of the moduli space M of flat stable locally free sheaves on a compact Kähler manifold X. It is known that a coarse moduli space of these sheaves can be constructed by geometric invariant theory and that it is a complex analytic space. The dgla that controls deformations of such a locally free sheaf E is the algebra A^{0,*}_X(End E) of anti-holomorphic forms with values in the endomorphisms of E. Goldman and Millson proved that on a compact Kähler manifold it is formal. Their proof is based on the existence of Hodge structures on the cohomology of a compact Kähler manifold and on a Lie algebra version of the the formality theorem of Deligne-Griffiths-Morgan-Sullivan [DGMS].For compact Kähler manifolds it states the existence of a quasi-isomorphism between the real de Rham algebra of forms and its cohomology. Putting all together, M turns out to have quadratic algebraic singularities, that is, it is locally defined by finitely many quadratic polynomials.
Quite recently Eyssidieux and Simpson in [ES] extended part of Goldman and Millson's theory to the filtered setting. They defined filtered dglas, filtered Maurer-Cartan and deformation functors associated to them. Under similar conditions for the dgla as in the classical case and with an hypothesis on the filtration, they proved the existence of a filtered formal local artinian algebra that represents the filtered deformation functor. As a consequence, they get a natural filtration on the Kuranishi space. Their main motivation for starting filtered deformation theory is the local study of a moduli space of representations.
In [P] Pridham worked in this direction too. He left the Kähler setting and studied the moduli space of representations of the fundamental group of a smooth algebraic variety. In this case, ordinary Hodge structures do not exist and the main tool becomes the existence of mixed Hodge structures. Using Morgan's theory of mixed Hodge diagrams [M], Pridham proved that the moduli space of such representations has locally mixed Hodge structures and that the equations, that defined it locally, have degree at most 4.
In a work in progress in collaboration with Joana Cirici, we extend classical deformation functors and dglas theory to the filtered and mixed Hodge setting and generalize Goldman and Millson's and Schlessinger's theory. In particular we are interested in analysing the Kuranishi space of a dgla with mixed Hodge structures, that satisfies a filtered formality property. Such a dgla is defined to be filtered formal, if there exists a quasi-isomorphism between it and the first

term of the spectral sequence associated to its filtration.
Our main aim is to use these tools to generalize Goldman and Millson's formality results of [GM] to the smooth case, in the same spirit of Pridham's work [P].
In the case of smooth algebraic varieties the existence of mixed Hodge structures will play the role played by Hodge structures in the Kähler case and formality will be replaced by filtered formality. Indeed, Morgan proved in [M] that there exists a quasi-isomorphism between the real de Rham algebra of forms of a smooth projective algebraic variety and the first term of the spectral sequence associated to the weight filtration.
Putting together these ingredients we expect to describe the local structure of the moduli space of locally free sheaves on a smooth algebraic variety.

§ Research project on singularity of moduli space of semistable sheaves on a K3 surface (with Timo Schürg - University of Augsburg):
Moduli spaces M of semistable sheaves on complex projective K3 surfaces X are constructed by geometric invariant theory too. The locus parametrizing stable sheaves in such a moduli space is smooth and carries a natural non-degenerate holomorphic 2-form. In particular, when the Mukai vector is primitive, there are no strictly semistable sheaves and the moduli space is a holomorphic symplectic manifold. The description is not complete when the Mukai vector is non-primitive: then closed points of M are in one-to-one correspondence with polystable sheaves.
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COSTO COMPLESSIVO DEL PROGRAMMA

Voce di spesa	Spesa (€)	Descrizione dettagliata (in italiano) (max 5 righe)	Descrizione dettagliata (in inglese) (max 5 righe)
Materiale inventariabile	*4.000,00*	*computer, materiale di cancelleria.*	*computer, stationery.*
Pubblicazioni	*2.000,00*	*c.a. 700 euro all'anno: per libri e riviste.*	*c.a. 700 euros per year: for books and journals.*
Missioni	*8.000,00*	*c.a 2.500 euro all'anno: per missioni a convegni e scuole o per lavoro collaborativo.*	*c.a. 2.500 euros per year: for missions to workshops and schools or for collaborating works.*
Altro	*16.000,00*	*Organizzazione di un workshop (8.000 euro): c.a. 10 speaker, c.a. 5 gg, 150 euro al giorno. Organizzazione di una scuola (7.000 euro): c.a. 5 speaker, c.a. 5 gg, 150 euro al giorno + compenso, fondi per finanziare partecipanti.*	*Organization of a Workshop (8.000 euros): c.a. 10 speakers, c.a. 5 days, 150 euros per day. Organization of a school (7.000 euros): c.a. 5 speakers, c.a. 5 days, c.a 150 euros per day + payment, some*

			founds for the partecipants.
	30.000,00		

LETTERE DI PRESENTAZIONE

nº	Nome	Cognome	Qualifica	E-mail	Ente
1.	JON	PRIDHAM	Professor (Chancellor's Fellow)	J.Pridham@ed.ac.uk	University of Edinburg
2.	CARLOS	SIMPSON	Professor	carlos@math.unice.fr	Université de Nice - Sophia Antipolis (Nizza)

La domanda è stata presentata in data *21/04/2014* alle ore *19:02*

ALLEGATI

Autocertificazione di stabile e continuativa permanenza all'estero, con impegno in attività didattiche o di ricerca, da almeno un triennio alla data di scadenza delle domande	dichiarazione.pdf

Pubblicazione realizzata nell'ultimo triennio	EM_Martinengo.pdf